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ABSTRACT

An initial philosophical analysis of "reading" has yielded; (1) that there cannot be a general definition of reading; (2) that the "focal" senses of "to read" indicate that reading is a form of linguistic perception carried out through the exercise of general linguistic abilities, adapted to a visual input of inscriptions with inherent linguistic meaning, so that differential linguistic perceptions, thus stimulated, correspond with objective meaning contrasts; (3) that "word recognition," exhibiting the same ambiguity as "to read," can be analyzed in its focal sense as the determination of the resultant (apprehended) meaning in accord with and in dependence on the objective meaning of the message unit; (4) that "to read" can be reductively analyzed in terms of linguistic abilities which are not specific reading abilities; (5) that there are neither specific reading abilities nor specific reading disabilities; (6) that presently available information concerning perceptual development, linguistic skills, reading defects and deficiencies can be incorporated within the conceptual paradigm here suggested. (Author)

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AN ANALYSIS OF THE CONCEPTS OF READING

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An Analysis of the Concepts of Reading

Author's Abstract

An initial philosophical analysis of "reading" has yielded: (1) that there cannot be a general definition of reading; (2) that the "focal" senses of "to read" indicate that reading is a form of linguistic perception carried out through the exercise of general linguistic abilities, adapted to a visual input of inscriptions with inherent linguistic meaning, so that differential linguistic perceptions, thus stimulated, correspond with objective meaning contrasts; (3) that "word recognition" exhibiting the same ambiguity as "to read" can be analysed in its focal sense as the determination of the resultant (apprehended) meaning in accord with and in dependence upon the objective meaning of the message unit; (4) that "to read" can be reductively analysed in terms of linguistic abilities which are not specific reading abilities; (5) that there are neither specific reading abilities nor specific reading disabilities; (6) that presently available information concerning perceptual development, linguistic skills, reading defects and deficiencies can be incorporated within the conceptual paradigm here suggested.

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Preface

This report contains an analysis of the concepts of reading, providing: (1) an alternative to general definitions,which are shown to be impossible; (2) an analysis of "word recognition"; (3) a generalization of certain questions concerning reading into questions concerning linguistic perception and linguistic meaning; (4) a distinction of focal and peripheral uses of "to read"; (5) a proposed paradigm for a focal sense of "to read", which involves the hypothesis that the ability to read is the adaptation of nonspecific linguistic abilities to a visual stimulus of inherently meaningful inscriptions. Certain theoretical problems concerning the place of cognitive units in the perception of meaning and the objects of linguistic perception are raised; and certain hypotheses concerning the nature of linguistic meaning are explained and developed. It is argued that the sort of conceptualization here presented admits of empirical interpretation, allows the incorporation of available experimental data, has predictive consequences, and will allow a useful application of what is known concerning reading defects and deficiencies, and that, therefore, this conceptual analysis meets the prerequisites for a theoretical paradigm of the phenomenon of reading.

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Chapter 1: Introduction, Problems, Methods and Procedures

A. Problems, Hypotheses and Conclusions.

Paul Kolers[1] and Jeanne Chall[2] both remark that during the last sixty years there has been little progress in the experimental study of reading. That observation is not fully representative of the last decade during which linguists, psycholinguists, perceptual psychologists, neurologists and developmental psychologists have made discoveries which will now allow the development of general theories of reading. These discoveries have not yet been fitted into a "paradigm"[3] of reading which incorporates what is already known and creates the directions and even the problems in which the next stages of research must develop, although Frank Smith's[4] "information-theory feature discrimination model" is certainly a significant beginning.

Inhibiting the creation of a general account of reading is the lack of common conceptual schemes, so that the assumptions of various researchers seem either to conflict (Gibson's[5] "decoding" talk about reading and Hichberg's[6] "extracting meaning" talk) or to be largely irrelevant to one another (the physiological discussions of the information contained in a single eye-fixation and its representation in optic nerve impulses and brain states, and the hypotheses concerning the internal development of rules by language-learners under the Chomsky theory. There is further conceptual discontinuity in the research results because some writers talk only in terms of neural impulses with scant or no mention of the internal states or subjective experience of the perceiver, while others talk about perception from the perceiver's point of view, not in "subjective experience" terms, but only in Skinnerian behavioristic terminology. That descriptions with such apparent disparity can be found to have a common focus and a common thrust is in itself a consequence of a general theory of reading.

We know this much at the outset of our discussion of reading: Reading must be regarded as a phenomenon falling within the general class of perceptual activities, within the specific class of linguistic perceptual activities, and within the still narrower class of linguistic perceptual activities stimulated by vision. More narrowly still, the visual stimuli must be elements of an inscriptional system which is inherently meaningful. Our investigations must naturally tend to inquire among the general truths already known about perception, linguistic perception, visual stimuli, inherently meaningful inscription systems and units of interpretation. Another thing we know is that since all perception is partially dependent upon the degree of cognitive development of the perceiver, general studies of cognitive and linguistic development may be of great interest. We have, then, a large body of data, larger than one might think at first, which will assist in the investigation of reading. In fact, so much is known about various phases of reading that it is all the more difficult to construct a general theory which incorporates it.

Right now our difficulties are not caused by ignorance about reading, though that is great enough, but rather by conceptual confusion in the face of enormous quantities of information and theory whose relevance is yet to be determined.

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This investigation begins with a paradox. On the one hand we need to know what "reading" is, in order to know what "scientific" or "experimental" information must be accommodated in its theoretical description; on the other, because there is not one thing which is exclusively and properly called reading or a general definition, we need already to have empirical scientific information about reading in order to know what kinds of things to group together and what to include in a general theory about reading.

There must be two sorts of theories about reading, two kinds of "understanding reading"; one sort of theory which, to be complete and even to be confirmed, does not require much specific experimental or clinical information; another, which may be the result of the first, which involves hypotheses touching upon the various sciences and requires detailed experimental and clinical confirmation.

The first sort of theory is a conceptual analysis of the concepts of reading and of certain associated concepts like "reads aloud" "understands the meaning of", "recognizes W (a word)" and so forth, to be developed in this report. We have to provide an acceptable surrogate for a definition of reading, so that we can, in a theoretical way, begin already "knowing what reading is".

Sometimes philosophical investigation if primarily a matter of conceptual clarification; a matter of rearranging systematically and demarcating manifold concepts, for instance, of "reading". The philosopher is like a helper in the workshop who arranges all the tools within reach and as they are needed for the task so that the workman (scientist) will not miss a tool or grab the wrong tool and strip a bolt or wreck a part of waste endless time trying to devise a new tool when an adequate one is already available. This is the clarificatory and theraputic role of philosophy which has been much emphasized by "ordinary language analysts", followers of Wittgenstein and Austin.

This report is more ambitious. Without slighting the responsibility to be clear about how the terms are being used and, indeed, while exhibiting the different senses of "to read" and "to recognize" (a word), we also undertake a paradigm search, seeking to determine whether there is a fundamental reading ability, a reading ability which is being exercised whenever any reading process is occurring and which can be exercised when nothing else, properly called reading, is occurring; and to develop an overall description, interrelating the various reading abilities and activities, of what is meant by assertions of the form "a given reading process, RP, yields a given output manifestation, O".

These general descriptions are designed to accommodate the known experimental data, to provide a very general classification of the kinds of reading defects and disabilities which will allow the wholesale incorporation of the body of information already assembled concerning reading defects and deficiencies, to be predictive about the location of deficiencies and the way reading processes occur, and to allow for experimental elaboration.

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A paradigm, which is not really a model because it is much more general than a model and admits of various kinds of models, is a general conceptual scheme (e.g. the interrelated set of concepts, "ability", "activity", "exercise", "output manifestation" and "adaptation" involved in the present theory) which admits of various models for its components. Whether a paradigm is useful or not depends to a large extent upon how much it facilitates the integration of knowledge, the formulation of research problems and the organization of unresolved questions and upon whether its basic conceptual scheme is congenial to the thought-habits of inventive scientists at the time it is formulated.[7]

After explaining the methodology and procedure of this report, we consider the various senses of "reading" and certain related concepts such as "failing to read", "misreading", "failing in reading", "not reading" and the family of concepts concerned with word recognition. Particular emphasis is placed upon the considerations which urge that we regard reading as a kind of perception and that we explore the parallels to listening. The selection of the material has a systematic end in view: to provide the basis for a clear distinction of classes of reading activities and reading abilities and to explain how the various sequences of reading activities, which proceed from a few abilities, can result in great variety of reading processes, which have a restricted class of behavioral manifestations. All these arguments are designed to support the general hypothesis that reading ability is an adaption of general linguistic abilities to a visual input of inherently meaningful inscriptions. We therefore, have to resolve the question of whether there are fundamental or specific reading abilities. This is accomplished in the second half of chapter 3.

Despite the variety of disciplines and the diverse and even conflicting vocabularies from which relevant research has come to us in the last decade, certain generalizations seem to be widely accepted now:

(a) that it is worth comparing and contrasting skilled reading with beginning reading and, temporarily, to deemphasize pedagogical objectives.

(b) that skilled reading cannot involve the identifying of every word and letter.

(c) that beginning readers, like beginning speakers, are rule-makers and set about this with some set of meta-rules for selecting rules.

(d) that rule-making involves some kind of "feature" or "notable characteristic" discrimination and rule-following results in characteristic or feature discrimination, so that perception is dependent upon the existence of cognitive units and results from the application of cognitive units to the sensory stimulus.

(e) that translation from seen-letters to uttered (vocally or sub-vocally) sound is not the characteristic form of reading; it is not the desired form; it is not as common as was apparently thought and it cannot be achieved as simply as was previously thought.

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(f) that in a classroom or test situation a child may be forced to adopt strategies of response (e.g. maximizing right answers or minimizing wrong answers) which may be inefficient for his discovery of the rules for reading, for his formation of cognitive units or for his processing the text in the cognitive units he possesses.

(g) that the reader's general linguistic ability and his general knowledge of the world and his specific knowledge of the content and form of a text to be read, as well as his knowledge of the grapheme-phoneme correspondences, orthographic, syntactic and semantic regularities are as important, in skilled reading more important than, the discrimination of individual letter characteristics in the visual array and function, though "higher cognitive units" in the brain's control of the eye fixation pattern and of the form in which information is grasped and stored. Cognitive units dominate the kind of contrasts which the reader notices in the text.

(h) that different readers read in different size units and different categories of interpretation of the optical neural signal to the brain, ranging from letter contrasts, word contrasts (meanings or sounds), phrase meaning contrasts, concept contrasts, propositional contrasts (in areas in which the reader is expert) as well as in units of literary association: symbols, style, architectonic and other formal patterns. The units are thought units which allow the detection of contrasts.

(i) that the reading activities of children are related to those of skilled readers as primitive approximations and are better to be understood from the viewpoint of skilled reading than the reverse: thus, the relevance of recent inquiries into peripheral search guidance[8], higher cognitive units[9], eye-voice span[10] and the indifference of bilinguals to the language form chosen for individual words and even to the grammatical peculiarities of the languages mixed.[11]

(j) lastly, that there has been something wrong with the usual accounts of the relationship of written to spoken language which have supposed that somehow the meaningfulness of written language is derivative from that of spoken language.

The General Hypotheses of this Report:

1. Normally skilled reading involves the exercise of:
   (a) nonspecific linguistic abilities
   (b) adapted
   (c) to visual perception via linguistic meaning through the interpretation of a stimulus of visible inscriptions which are inherently meaningful.

2. All reading processes have reading outputs which may be exhibited in reading output manifestations.

3. Reading difficulties, disabilities and defects may be due to (a) impairment, defect or failure of development of the distinguishable non-specific

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linguistic abilities; (b) defect or deficiency of adaptation of linguistic abilities from an auditory to a visual modality; (c) impairment, imperfection, deficit or developmental lag in the perceptual abilities for visually processing the visual array -- abilities which are testable on non-inscriptional material; (d) impairment, imperfection, deficit or defect in the motor or sensory modes required for manifestation of reading.

4. That reading is a specific form of linguistic perception can be better understood if we analyse the comparable processes in oral speech. Thus some of the problems about reading are similar to those concerning how we recognize thought in the patterns of sound which reach the ear in conversation. Reading is an instance of the acquisition of ideas (beliefs, concepts, and affective states) through linguistic perception from sensory stimuli with inherent linguistic meaning.

The Main Conclusions Reached:

1. That there can be no general definition of "reading" but that a conceptual analysis of the focal senses of "to read" reveal salient features which indicate that reading must be analysed as a specific form of linguistic perception.

2. That word recognition, as distinguished from word identification, can be analysed as "the determination of the resultant meaning in accord with the objective linguistic meaning of a unit of text".

3. That reading processes are the sequenced exercise of various reading abilities which, over time, yield reading outputs. Thus we can explain how a limited class of abilities and a limited class of output manifestations can be interconnected by a very large class of reading processes.

B. Methods and Procedures; (a) Logical Analysis

The general background of the method is logical analysis, the examination of the logical structure of the subject. Logical analysis can either be formalistic, through the construction of formal systems, such as Carnap's inquiries into language, or largely informal, stressing the discovery of logical order within the ways terms are used in ordinary discourse; this is frequently called "linguistic analysis" and, when restricted to expressions of ordinary discourse, it is sometimes called "ordinary language analysis". While what is done here is influenced by the work of Wittgenstein and other ordinary language philosophers, it is closer in spirit to certain intermediate kinds of analysis practiced by B. Russell, notably in such works as Human Knowledge, its Scope and Limits.[12] Here elements of formal analysis, ordinary language analysis and certain systematic considerations are blended together into a project of logical constructions.

(b) Contextual Definition

One of the outstanding achievements of recent philosophy is the variety of ways that have been developed to escape the difficulties of the traditional project of providing definitions for terms which are central to the inquiry. Beginning with Russell, the concept of "contextual definitions" has gradually expanded to take account of the fact that most of the terms one would want to analyse have a variety of distinct meanings and that one definition or

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or analysis will not take account of their subtle contrasts of meaning in contrasting contexts. As a result, definitions are not proposed for isolated terms but for terms in sentential[13] context.

The second notable element of contextual definition is the form in which the expression to be analysed is expressed and the form in which the analysis is expressed. The term to be analysed is embedded in a complete sentence frame (e.g. "S read aloud the first five letters of the alphabet") and the analysis is expressed in a list of statements each of which must be true if the original expression is true and all of which together are sufficient for its truth. These are called "truth conditions".

It turns out that, with the exception of some surprising cases, the development of a full contextual definition is usually quite difficult because we find the employment of terms in ordinary discourse is so loose that there are alternative sets of truth conditions for an expression of the form "S read aloud the first five letters of the alphabet". Even when we are trying to be most careful, our uses of such terms as "read", "understands", "recognizes", "remembers" and "expects" are ambiguous. For instance, is it or is it not a necessary condition for "S reads W aloud", when "W" is a word, that S should recognize W and should identify W by correctly sounding it? Suppose that S does not recognize W but correctly sounds it? Or that S does neither; did he not read it aloud? In some situations we might insist on one as against another reply. Thus there will not be much to be gained from a long list of contextual definitions of the terms involved in the discussion of reading. Rather, we shall draw out their differential meanings far enough to make clear the variety of meanings each has and to indicate that in reporting empirical research, the investigator should be quite clear in just what senses a term if being used and that the touchstone test for clarity would be his offering an explicit statement of a set of "truth conditions" for the key expressions involving the terms. Operational definitions, which are familiar to most scientists, may be considered a species of contextual definitions provided that the operational conditions apply for a whole statement rather than a single word and that the conditions be formulated explicitly.

(c) Logical Construction

There is another application of the technique of analytic definition to the enterpr[illegible] of theory-making and that is in the method of logical constructions. This consists of the analysis of one set of concepts in terms of a quite different set of concepts and of providing evidence that everything one can say using the first set of concepts can be said, more circuitously no doubt, using the second. We do not have then to postulate that the first thing is a reality different in kind from the second. Looked at one way, the analysis is reductive; looked at from the other direction, the analysis is constructive. It is the objective of this report to show that we can analyse reading as a logical construction out of perceptual and linguistic abilities no one of which is itself a reading ability. In other words, what has been attempted but unsuccessfully by those who want to show that all mental-state talk can be reduced, logically, to talk about brain-

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states, can be accomplished in the more modest subject area of reading (where we are not so parsimonious about what we will allow into the class of concepts which belong to the analysis). In a sense, all logical consttuctions are "nothing but" analyses; so one could count a behavioristic analysis of thinking as an attempt at logical construction.

We need conceptual definitions and logical constructions because there can be no general definition of "reading". The reason is quite simple, though illustrating it sufficiently takes a chapter: there are quite different things all of which are correctly called reading, things which belong to no one class narrow enough to exclude incompatible things. Wittgenstein, who developed hte notion of a set of family resembling terms, explicitly recognized in the Blue and Brown Books and the Investigations that "read" like "game" has such a family of resembling uses. For example, if we were to go along with those who say that reading is "the extracting of meaning from verbal symbols presented visually", we should have to exclude as reading the uncomprehending processing of perceived inscriptions which is quite common when we run into very different texts and would have count as reading the "extraction" of meaning from texts by the wildest forms of correlation (done sometimes by fanatics). Nor will it do for the proponents of such definitions to tell us that we are to take them with "obvious qualifications"; to be useful the definition must not have "obvious" qualifications which cannot be spelled out. I can certainly read aloud passages in French, Latin, Italian and English which I do not understand and which, quite literally are meaningless to me and, in some cases inherently meaningless (e.g. some passages in English from I-Ching). Moreover, students frequently point to a passage by existentialists and phenomenologists which can certainly be read both aloud and silently and can be translated but which cannot be construed with any coherent meaning as a whole. "Corsciousness secretes its own nothingness".

And besides these exceptions, there are exceptions in the opposite direction, where a person can read a word whose meaning he does not understand, or a whole list of words whose meaning he does not understand. Certainly this is reading and it is not extracting meaning from verbal symbols presented visually. In fact, in certain cases, one quite satisfactory "reading-output manifestation" is a subject's report that the passage means nothing at all. So to extract a meaning for the verbal symbols, apparently there does not have to be a meaning you ! And lastly, there is the experience, no doubt shared by all readers, of reading along without extracting any meaning at all, but with the clearest recall on reareading that the passage was read before and not merely skipped. Obviously, even a skilled reader can read without extracting a meaning from presented verbal inscriptions. Reading can't, therefore, be "extracting meaning from verbal symbols presented visually", though, of course, some reading is just that!

Definitions which attempt to be minimal, such as "reading is the decoding of visually perceived verbal symbols into their correlated spoken symbols" are equally defective because so much of reading goes on without such "decoding" and the very notion of "decoding" is inappropriate because it implies that the signal decoded (like dit-dots of Morse signals) does not have inherent linguistic meaning but only derived linguistic meaning which consists in the correlation of its parts to uttered symbols which have their meaning relationships inherently.[15] This is simply a misunderstanding of the fact that written language has as much inherent linguistic organization as (and in fact, where rules are taken into account, much more than) spoken language. The very speed at which skilled reading is performed, as well as various bits of experimental evidence concerning sub-vocalization and partial sub-vocalization, indicate that the skilled reader does not produce

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a sub-vocal counterpart of the written inscriptions which would be sufficient to count as a process of decoding. We would, on such a definition, have to exclude as reading the very processes we would like ourselves and our children to be most adept at, the grasp of meaning without an intermediary translation stage.

Defenders of such definitions will be quick to point out that the definitions were not intended to cover all reading activities but only those of the beginner. But two difficulties arise here: first, the beginner is then evidently not doing what the adult is doing and there is no evidence that "decoding" will ever lead to the adult process or is even a necessary preparation for it. But even allowing all those assumptions, there are still cases of "reading" on the primitive level where a child is supposed to match columns of words with one another, in some cases finding the opposites in meaning and in some cases finding synonyms. Now surely, even if the child does not say the words to himself, successful performance on such texts is counted as reading; so also is unsuccessful performance which exhibits certain patterns of error. There will be a number of other illustrations given in the chapter that follows. For the time being this should be enough evidence to suggest that the expression "S read w" is used in such a variety of conditions that it has no one set of truth conditions. Therefore, there cannot be a single definition of "S reads w", where "w" is some word or list of words. If we let "w" range over letters, syllables, words, phrases, sentences, paragraphs, backwards sentences, books and various other things, it will be evident that the categorial contrasts of the substitutions for "w" will guarantee that the senses of "reads" must differ. This is parallel to the contrasts in "expects" in the expressions "S expects a friend"; "S expects a raise"; "S expects to fail".

Wittgenstein remarked that we probably use the word 'read' somewhat differently when we are talking about beginners as contrasted with talk of adults;[16] but this is no more startling than to hear that we use the word 'walked' somewhat differently of little babies than we do of adults; for instance we say of the baby "he walked today" when corresponding behavior (three steps and a subsequent fall) in an adult would cause us to sayx"he couldn't walk today".

"S read w" is an equivocal expression; it cannot have a definition because there is not one phenomenon which is encompassed. And it will do us little good to define an ideal or objective state of reading either. For what is really proficient reading? Getting everything contained in the message? But what is the objective measure of the content of the message? What is contained is in part a function of what the reader has to bring to the text in the way of previous information, cognitive units and appreciative or critical associations. The show title "Two if by Land" may be utterly meaningless to some, minimally meaningful to others, suffused with historical associations for some and misleading to others.

This should be sufficient, when further supported by the details of the following two chapters, to falsify Gephart's proposal:[17]

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"Truth about the semantic base for reading has to be unitary. If multiple definitions exist two situations follow. Either the several definitions delineate only parts of what is subsumed under the term "reading", or some of the definitions are incorrect. The incompleteness assumption is accepted here, resulting in the description of the term "reading" as an equivocal term. The field should work toward a state of knowledge about reading that would enable the description of the term's usage under analogous or better still, univocal, definition."

Of course some of the definitions are plainly incorrect. And Gephart is right on one point The term "read" , at least in the past tense, transitive form, "S read w" is equivocal. But there is no point at all in trying,as he proposed, to arrive at a unitary definition. Rather we should try to be quite clear about the contrasting sets of conditions which we consider in certain circumstances to render such an expression "S read w" to be true. For thereby we develop an understanding of the range of interrelated processes which really are cases of reading. That allows us to attempt to classify the abilities involved.

Since we are not dealing with a small and easily managed set of different meanings but with an indefinite set of meanings which shade into one another and which can be expanded at will by the invention of new borderline cases, it is appropriate here to insist that contextual definitions should be developed with strategic objectives in mind; otherwise the process can be endless for any common term in English. The whole purpose of such definition is simply to make clear the truth conditions for the application of the term in a certain well-defined context; since clarity is the function of the definition, such definitions are instruments and are to be framed for specific purposes of inquiry. Our is logical construction: To devise a conceptual paradigm with which we can show (1) how various reading activities are organized toward particular reading outputs; (2) how they are to be distinguished from one another; (3) how the individual processes are structured logically; and (4) how they are related to non-specific abilities whose exercise is ordered, sequenced and automated to yield the various reading processes. The overall objective is one of logical construction: to show how the various abilities to read can be considered logical constructions from other abilities which are not specifically abilities to read. The fundamental hypothesis of this report is that,analytically speaking, an ability to read (of which there are several) is logically the sequencing of the exercise of other abilities, no one of which is a specific reading ability and each one of which can be empirically tested and observed independently of an application to visible symbol inscriptions.

Chapter 2: The Concepts of "Reading"

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"Reading" Variety: Meaning and Use

(a) "Reading" is not a univocal term. The noun "reading" can refer either to an ability or to an individual activity or to a group activity (in a school program) ; it can refer to an abstraction, as in "Reading is theoretically quite problematic", and to another kind of abstraction entirely, as in "Jones likes reading". Moreover, "Jones likes reading" could mean that Jones likes to read (presumably not everything but certain kinds of things); that Jones, a teacher, likes to teach reading; that Jones, an announcer, likes reading the news, say, as contrasted with extemporaneous commentary. Apart from its determinate contexts, there cannot be a statement of what is meant by the term "reading", used as a noun.

The same is true of the cognate verbal forms, but the consequences are far more important. But, first, two introductory points are needed. (1) The third person singular verb form, "S reads w", is never used as an indicator of simple activity; it is always confined to indicate either ability (S reads third grade level books), or proclivity (S reads detective stories), tendency, habit or the like (S reads other peoples' mail, S reads his mail first thing each morning") even expectation, (S reads next). There is, then, an important use of "reads" which indicates ability to read, with various overtones of habit, proclivity, interest, motivation and the like.(2) There are various criteria for differences of meaning which need comment here.

(b) Difference of Meaning. Philosophers have a number of criteria for the difference of meaning of two sentences, S and S'. They differ in meaning if there is something logically entailed by the one which is not logically entailed by the other. Sometimes this is not easy to determine, but there are additional tests. For instance, S and S' differ in meaning if a given paraphrase of the one is not a paraphrase of the other; or if a given transformation of the one is not a transformation of the other. S and S' differ in meaning if the conditions for verification of the one or the conditions for the falsification of the one differ from those of the other.

In pragmatic contexts there are other texts, each of which is sufficient. S and S' differ in meaning if the conditions for an appropriate objection to the one differ semantically from the conditions for an appropriate objection to the other. The same holds for the conditions of appropriate questioning of the truth or sense of one or the other. Whether these are all equally good tests is not something we need to debate here; they are serviceable on the whole and doubtful cases can be handled specially. On each of the tests "S is reading Great Expectations" and "S read Great Expectations" will differ in meaning, as will "S reads Great Expectations each morning".

The various terms, "read", "reads", "recognized", "identified", that function importantly in discussions of reading are, like the other common terms of English, susceptible to semantic contagion from terms in their environments. They undergo meaning adjustments required by other terms in the sentential and discourse context.[1] And the criteria for different

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meanings of pairs of sentences (regardless of whether they contain exactly the same words) given above, arenot sufficient to locate those differences of meaning. That is, in the pair of sentences "Plato knows philosophy" and "fido knows his doghouse" is the difference of meaning, which will exhibit itself on any one of the tests mentioned, located entirely in the differences of subjects and objects or is the difference also located in the common term "knows"? There is not a generally accepted test by which we can show that two different substitutions of a sentence frame "Jones negotiated the x" differ in meaning with with respect to a particular term "negotiated" when we substitute contrasting objectives: "Jones negotiated the bonds", "Jones negotiated the sale", "Jones negotiated the curve". Yet, the differences in conditions of verification and falsification suggest that there is a difference in meaning with respect to that common term and there are some quite reliable auxiliary tests which locate the meaning differences fairly well. For instance, consider the corresponding "failure" or negative situations. Jones failed to negotiate the curve (the bonds), (the sale)"; Jones failed in negotiating the curve (the bonds)(the sale); Jones mis-negotiated the curve (the bonds)(the sale). The contrasts in conditions of verification and falsification and simply, in the observable events that would be involved, reliably indicate that the semantically contrasting objects induct semantical contrasts in the common term "negotiated" and its correlative negatives and contraries. The same holds for the term, "read" and for the transitive, progressive present "is reading". Where we use forms of these words to refer to an activity, whether completed or in progress, suitable contrasts in the expressed or implied object of the activity will induce contrasts in the meaning of the term "read" or "isreading". This means that there is not one activity or one simple class of activities which is reading, but that the very kind of activity which is going on or which went on, is a function of the object upon which the activity was directed. (This correlates well with contrasts in what-is-perceived that are discussed at the end of this chapter).

(c) Difference of Object. Now we have to be more specific about the "object upon which the activity is directed". In some cases we may literally mean a physical object (e.g. a line of letters, as contrasted with an organized sentence, or a book). But in other cases the object of the activity is not so much the thing named by the grammatical direct object, as it is the intended output of the activity (e.g. reading aloud, reading for sentence or paragraph meaning, reading for correct spelling, reading for story-line, character development, political slant, incorrect assumptions etc.); and the intended output, if achieved, is made accessible in out-put manifestations (responses on tests, voluntary reports, etc.) the contrast of process is not correlated as closely with contrast of objects as with the contrasts in the resulting perceptions.

For each of these reading outputs, there is a corresponding set of senses of "S failed to read.....", "S failed in reading x", "S misread x", and "S did not read x".

In another dimension, the term "read" (past tense) forms a family resembling set of same-term occurrences, where the expressed or implied objects are in categorial contrasts of quite different kinds from the small group of objects that we will consider.

1. "We want a child to learn to read a ruler". "He read the ruler, but lost count of the eighths."
2. "He read the letter but confused it with a 'd'".
3. "He read the book but could not understand it."
4. "He read the word but said he did not remember its meaning." "He read the word and told me what it meant but could not pronounce it."
5. "He read the speedometer and said we were going too fast". "He read the odometer and said the car was worn out."

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6. "He read the entire part at the audition but gave it no meaning."
7. "He read, understanding the words but not the ideas."
8. "He read the French book to me in English."
9. "He read my English book to himself in French."
10. "He read the Arabic numerals in Roman numerals."
11. "He read the entire story but could remember none of the characters' names nor the city where it happened nor even the period in history."

It does not seem that any of these sentences expresses ideas which are necessarily false (like "Three and three are seven") or necessarily metaphorical. Rather, taken as a group they indicate the enormous variety of truth conditions which we allow for statements whose key term is "read" and whose basic form is: "He read X.....". If one has the least doubt that one can read a set of rules and in one sense understand the words and in another not understand at all, though evidently one could read them aloud quite competently and with proper phrasing, then read the Federal rules of Civil Procedure. There are kinds and kinds of reading; it is the naivest of theories which will minimize their differences.

2. The different senses of "S read x" exhibit dependence upon contrasting pragmatic conditions and differences of truth-conditions.

Consider the conditions of applicability for expressions like (1)"S read Catcher in the Rye", (2) "S read the title of Catcher in the Rye", (3) "S read the first sentence in Catcher in the Rye", (4) "S read the first clause of the first sentence in Catcher in the Rye", (5) "S read the first word in the first sentence in Catcher in the Rye", (6) "S read the first letters of the first word in the first sentence in Catcher in the Rye", (7) "S read a map of New England to find his way to Cape Cod", (8) "S read the names on the building directory", (9) "S read the dictionary entries for 'apple'", (10) "S read the score for the Beethoven First Piano Concerto", (11) "S read a comic book while he was waiting for a bus".

We can see that completions of the sentence frame, "S read NP " differ, in the sorts of things whose names may be substituted in the object position, that those substitutions refer to categorically contrasting things and that as a consequence of the categorial contrasts of the objects, the truth conditions for the applicability of such a complete expression to a particular situation vary considerably from one another. And they differ not just in the designation of the object which is read but in the processes which are involved.

Secondly, we see that there is not just one process that might be involved in a particular reading task but rather, depending upon what criterion we have, there are different sets of truth conditions which would apply. For instance, some people would say, S had read the comic book only if he had read all the words in the clouds within the blocks; others, if he could recount the story, regardless of whether he had read the words; others, if he had a version of the story by which it is recognizable that his recounting is controlled, even if not successfully, by the text and pictures; and so on, through a long list of alternative criteria. The expression, "S read a comic book", apart from some supposed background standard of what it is to read a comic book, is vague.

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Imagine how much more vague is the general statement "S read Catcher in the Rye". What does S have to know afterward that he did not know before in order for this to be true? Does he have to recognize the story if we tell it to him? How long after? The same holds for "S read the first letter of the first word in Catcher in the Rye". Does S have to have said the letter? Does he have to answer correctly what the letter is? Is it sufficient that he understands the sentence, even though he may have skipped the first word? But what is it, in reading, to "skip" the first word anyway? We are certainly not requiring that for a person to read a passage he must fixate on every word; nor a fortiori, do we mean that he must fixate on every letter. Then, if S read the first sentence of that book, does it follow in that context that he has also read the first word and indeed read the first letter? The answer is that we do not have linguistic conventions which are decisive on these questions. Either answer is correct, depending upon what one intends to conclude from it. And sentential implication relationships of expressions in English are in many cases indeterminate apart from a context in which some convention is adopted, some stipulation offered or some assumption implied. "S read Catcher in the Rye" does not entail "S read the first letter of the first sentence in Catcher in the Rye" or even "S read the first sentence of Catcher in the Rye". And the latter does not entail that S read the first letter of the first word in the sentence. All are logically independent of one another.

(a) Context dependence of what counts as reading. Now the way this sort of problem is handled in contexts where reading is under discussion or is being taught is that the participants explicitly, or implicitly, adopt an output criterion. That is, they adopt some behavioral manifestation or group of behavioral manifestations as the necessary conditions for the truth of expressions of the form "S read the first letter of the first word in Catcher in the Rye". For instance, they may adopt some all-or-nothing criterion like: Can S name or write the first letter? That will not be a decisive test by itself, because S may simply guess luckily or because he has some reading difficulty put "p" for a "d" or the like. That will not, apart from a separate convention to the contrary, decisively settle whether he read the first letter or not.

At the early stages of teaching reading the criteria as to whether a beginner has or has not read a letter or a word are imposed by various sorts of unarticulated conventions which in effect determine the meaning of the word "read" in the context and may determine the meaning in ways quite different from its uses when we talk about adult reading, with the result that the activities of the child may have no demonstrable or even coherently describable relation to the activities of the adult which receive the same name. However, rather than take the perverse road of skepticism, we assume that there is an unarticulated logic in the ways experienced teachers have tested their pupils for reading performance and regard the behavior which is used as a truth determiner for "S read the first letter of the word 'dog'" as the "output manifestation" of the results of s' reading process. For example, if in a certain context he is considered to have read that letter only if he can, while looking at the word, say it aloud, or if he must select an equiform letter from a list of letters, or if he must underline a word which begins with the same letter; in each case, I consider the test behavior as a sufficient output-

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-manifestation of reading when S gets the right answer. We need not conceed that S has not read the letter whenever he fails to produce the expected output-manifestation; for he may be obdurate, disobedient, motor or speech handicapped, confused, or unmotivated. Thus what in the classroom situation may be regarded as a necessary condition for reading that letter can at best, from a theoretical point of view be a sufficient condition for S' having done so, and that requires that we ignore chance, accidents and lucky guesses.

We observe that for the elementary reading processes, such as letter reading, word reading and phrase reading, there are various sorts of behavior manifestations which teachers use to determine whether or not the reading process has occurred and to what degree it has been successful. I call these things "output manifestations" and have listed some of them at the right-hand side of Table I in Chapter 3. I do not pretend to have found the full range of output manifestations which are from time to time used by inventive teachers as criteria for the occurrence of one of these kinds of reading; it is enough for now that we observe that there is a fairly standard range of these manifestations which have been consecrated by their incorporation into standardized tests of reading performance, measured comparatively.

It would be a mistake to think that any one of these results (e.g. saying the letter aloud) can be reached time after time and correctly through only one process. As will become clear in Chapter 3, there are a variety of processes which can, as defined in terms of standarized out-put manifestations, be called "letter reading processes", even though their component elements differ markedly. But, this is one of the conclusions I want to demonstrate. For now, it is sufficient that we note that processes will be called "letter reading" or "word reading", etc., in terms of whether they meet generally accepted out-put manifestation tests, regardless of their other differences. Test makers, aware that there are varying processes by which one may come up with indistinguishable results, adopt strategies designed to limit the range of processes which can be employed. Thus, they will, on a letter reading test try to eliminate letter-reading which proceeds from whole word recognition followed by analysis of the word into its spelling. For our purposes it is sufficient to classify processes into groups in terms of their outputs and to group and identify the outputs through the standard out-put manifestations which we find in various reading work-books, classroom reading exercises and tests; that gives us an initial description of what we mean by "utter reading", "word recognition", and the like.

When we get to reading outputs, such as "S read Catcher in the Rye", then "S read C in R" and "S' read C in R" may both be true without its being true that the same reading processes were used by S and S' even though both may satisfy equally well the overall out-put manifestation criterion. For instance, S may read the book "word for word", whereas S' may read some parts phrase by phrase, others, word by word and in some cases have to resort to sounding out words, reading a sentence aloud or spelling words to look up in the dictionary. And another may combine those processes with various sorts of meaning anticipation and meaning search.

(b) Inconsistent truth conditions across diverse contexts. Not only are there diverse conditions of applicability for the term "read" (p.t. trans.) we have, in ordinary usage conditions of applicability which are incompatible

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in the same context.

It would be proper to say Smith had read a certain sentence which we are sure he had never seen before, if after looking at the written sentence he could look away and repeat the whole thing to us.[2] And this, regardless of the fact that it is in a language which he can pronounce but cannot understand, or in words he can pronounce but does not know, as when my ten year old reads "Ontogeny recapitulates philogeny" and asks "What does that mean?". To have read "ontogeny recapitulates philogeny" the person does not have to say it aloud correctly; for instance, he may put accents in the wrong place or skip a letter or syllable. In fact, you cannot misread something without being in some process of reading it. Whatever word or sentence is misread must be read. Misreading is not at all the same as not reading; and not reading is not the same as failing in reading something (performing inefficiently enough to fall below some standard) which is, in turn, different from, but causable by, failing to read something.

Reading can certainly go on, paragraph after paragraph, without the reader's attending to what is meant by the words. This is reading without (in the absence of) understanding. It is something one can do when reading a speech of one's own, while thinking of extraneous events. That is different from another kind of reading without understanding, when one is unable by trying, to understand what he is reading. None of these is the same as reading and misunderstanding what is read; and yet misunderstanding, like mis-reading, can go on only if reading is going on.

Reading without attending to the meaning, reading while attending to meaning but while being unsuccessful in grasping a meaning, and reading with attention to a meaning which is misunderstood are all cases of reading. Reading without understanding, whether that involves suspension of attention to meaning, failure to grasp a meaning or error about the meaning grasped, is still reading. It is therefore evident that one can read without extracting any meaning which is there from the text. (That also calls our attention to another fact, that in certain respects what meaning there is in the text is there inherently and not on account of the relationship of the text to a spoken correlate. But we shall return to the theme of inherent meaning of inscription systems later.

A person may be reading a text but in such a way that he is wholly unable to say afterwards what he has been reading. One quite simple explanation for this is that the material, after being processed into his short-term memory is simply not interesting enough to be put through the longer process required for long-term memory. The reader may be looking for certain information (e.g. the names of Josephine's parents) or he may be interested only in certain features of what was written (e.g. whether the thought processes are formally expressed, whether the vocabulary is repetitious, whether the style is identifiably that of a certain author) and, as a result, information which neither satisfies nor defeats such search objectives (and related hypotheses formulated during the reading) is not stored. The reader thus attends to the thought content while he reads but without processesing it into storage. Yet, like a face, the same text when read again in a short while will be familiar; it will certainly be a text "which he has read before" even though in the previous reading his attention wandered and the thought content or at least any coherent overline of thought was lost to his awareness. These sorts of examples show that among the senses of "S read y" the senses which imply that "S understood y" or, "S remembers y" (at some later date) are not especially privileged and are not, apart from pedagogical ideals which we may set up

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for our educational system, more reading than are some quite different kinds of text processing. Moreover, you can, under certain circumstances read something you understand (like a set of directions on how to find your own office from where you are) and, even though you are attending to it, not comprehend it; e.g., a nervous student taking a reading comprehension test when he is unable to reinforce his understanding by getting the material into his memory. These are the very things we do not want children to do, but they are still cases of reading.

These examples show that while in some circumstances "S read x" entails that S extracted a meaning from X or that S understood X, there are circumstances where there is no such entailment and, in the case of letter or name reading, such an entailment is excluded. Since everything entailed by an expression is a truth-condition for the statement expressed, the truth conditions applicable to "S read x" in different contexts are incompatible with one another. Therefore, there cannot be a general definition by way of truth conditions for "reading" which would be applicable in all contexts where the term defined is applicable. That is the same as saying that there cannot be a general definition of "reading".

Another illustration of the contrariety of truth-conditions for 'S read x" can be found in the diversity of truth conditions for "S read x aloud". In the saying of words read, the correlation of the sounds chosen by the pupil is not supposed to be purely accidental in its coincidence with the way the words are generally pronounced. What we count as reading aloud positively (in the normal case) excludes an arbitrary correlation of sounds and inscription units which deviates too far from customary soundings. But we should think of this at two levels. If the correlation is quite arbitrary and yet still regular, we may on the basis of its recognizability count it as a reading in some obscure or concocted dialect or combination of foreign accents and English sounds. But if the correlation is arbitrary and irregular so that some visual configurations receive unpredictably different soundings, then we may not count what we hear as a reading aloud. But why not? If what sounds the utter produces are in fact controlled by the array of perceived inscriptions, then the fact that the sounds which are emitted are idiosyncratic even to an extreme, (provided they are related by some rule which the reader can be said to be following and such that another person who follows the same rule can produce a similar set of sounds and provided that the correlation is clearly not coincidental with visual form)does not make it fail to be "reading aloud". Wittgenstein noticed, a single word-sounding will never be a sufficient indication that the person is reading; for we will not have at hand enough information to know whether the sounds he produces are related to the text in some regular way; so also a single word mangling (in reading it aloud) is not sufficient to show that the person was not reading. How long a string of words do we need, to be sure what the answer is? "It depends". In most cases we need very few words to identify success or failure; yet situations could arise in which it would be difficult to tell short of thousands of words whether we had a reader or not and we could theoretically imagine any finite number of correct guesses about which sound comes next by a performer who appears to be following a rule when he is not. But these are logical extremes, raising not so much questions about reading as general philosophical questions about what rules are and what following a rule consists in.

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We speak of a person's reading strings of nonsense words or nonsense letters or arbitrary letter-signs, etc., or learning to form sentences in a "language" which has no linguistic meaning, and no sense meaning but only a grammar; and in none of these cases do we have reading processes applied to strings of inscriptions which have inherent linguistic meaning. But that just illustrates that what we call reading in some context has an necessary condition (the inherent linguistic meaning of the inscriptions) something whose absence is a necessary condition for something called reading in another context (since, if in some of the perception experiments the subjects began to recognize groups of letters by their "sense" meaning and not by a 'scanning of letter features", the experimenter, if he discovered the deviation, would say that this was not the reading process he was examining and that the requisite process (call it "visual feature identification") had not been going on.) The absence of inherent or even associated linguistic or sense meaning is a necessary condition for performing some reading tasks in some contexts; in others, the presence of inherent meaning is required and in others it is neither required nor excluded. Ordinary language uses of "read" belong mostly to the second and third groups. But overall, there cannot be truth conditions either requiring or excluding extraction of meaning or even requiring meaningful text. So, again, there cannot be a general definition of"reading".

(c) Different Processes with Similar Outcomes: Extrinsic Criteria for Whether Reading Occurs. Reading books, reading words, reading phrases, reading numbers, reading scores, reading lists and reading signs are not one and the same process applied to different subject-matters, as would be sawing two-by fours, two by sixes and two by tens. For the nature of the thing to be read places constraints upon the elements and sequencing of elemental processes involved (like the differences between sawing logs, sawing cement and sawing steel). Besides, the outcomes of these processes are different, with one being able to obtain without the other. That indicates that not only are the processes different, but the abilities which the processes manifest are different as well. And as we have already pointed out, even where "y" is the very same thing, under different circumstances, what will count as a case of "S read y" will differ. For what counts as a case of S's reading y depends upon the sorts of manifestations which have been privileged: SRA responses, oral answers, reading of questions and subsequent oral answers, oral narration, etc. For instance, if S follows our progress on a map where the route is already marked and does so by matching sign names to names on the marked line, shall we call it a case of his "reading the map"? That is not at all the same thing as to read the map to determine a route not already marked and then to guide our progress by reference to the map. Sometimes to read words consists in being able to say them aloud; sometimes, in being able to select synonyms and antonyms from a list which is written; sometimes it involves selecting words that begin the same way or end the same way or have the same vowel; sometimesin completing sentences, etc. These outputs, which may be manifestations of word-reading, certainly need not be the result of a single process which, if once mastered, yields all these kinds of outputs. These processes belong to general classes of "word recognition processes", but that merely underlines the fact that processes are classified as belonging to the same class because of the conventional classification of their output manifestations; and the processes may in fact be of logically quite different types. This will be discussed further when we consider (Ph. 3) the ordering of various reading processes.

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Suppose a child reports that in school sometimes they read columns of words in order to match pairs of same words and on other days they read columns of words to match pairs of opposites. There are many different things that may have been done: i.e., spelling out the words and looking for words with the same letters in the same order; saying the words to oneself and looking for words that are said the same way. Would finding opposites, which could not be done in either of those ways, be called reading and neither of the former processes? Only if there is some privileged sense assigned in the context to the term "reading", perhaps with some particular instructional goal in mind. And yet, if Johnny is supposed to be looking for opposites and goes about it by spelling out words and then looking for words with the same letters in the same order in order to eliminate them, he will in the time allowed probably get no right answers and will be thought not to have been reading or at least not to have been reading with minimal proficiency though the process, we know by hypothesis, he was carrying on is a reading process. That shows that whether or not a given activity is a reading activity depends upon what is demanded in a given case as the minimal output manifestation. And the fact that a person is carrying on some other reading activity than the one tested is pragmatically meaningless in the circumstances.

Although these are all cases of reading, from the point of view of some particular kind of reading that one wants to develop in a student, one or another activity may simply not count as reading in certain circumstances. This applies to all the reading processes which we shall distinguish. Anything is a reading process that in some circumstances will, in correct usage of the term, be considered to have yielded behavior which manifests reading. But there will always be some context in which each of these processes will not be considered reading, because, without context, their behavior is not an acceptable manifestation of reading.

Let me illustrate that with an extreme case. "Suppose cognitively guided search of meaningful inscriptions which on the basis of the person's prior cognitive units allows him to extract a meaning controlled by the inscriptions and closely correlated with the inherent meaning of the inscriptions" is an ideal form of reading. If a person assigned the task of proofreading a text, should perform the operations above mentioned upon it, he will be said to have failed to proof-read the text, or at least to have failed in proofreading it. What counts as a case of reading or of minimally proficient reading is therefore context-bound, and though we may for good social and educational reasons prefer certain sorts of processing of the visual array of meaningful inscriptions, there is as yet no sound evidenct to indicate that these sorts of processings are best acquired by one's learning one sequence of intermediate sorts of reading over another.[3]

There is no "absolute" sense in which we can say of a person "S read y"; rather, there is a family of varying but partially overlapping sets of conditions, bound to both pedagogical and social objectives, which we consider to be truth conditions for a person's having read (in some particular sense) a certain text.

To take an extreme case: in the state of New York, those passages of an installment purchase contract which are printed in type face which meets the legal minimum size are conclusively presumed to have been read by the person

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who signs the contract, regardless of the fact that in another sense of "read", only an expert would be said to have grasped their substantial implication, whereas, any passage printed in legally unacceptable type size is presumed to be unread, regardless of the fact that the reader may otherwise fully understand the text. This, of course, is a case of a social or institutional restriction, upon what will count as "having been read by S".

3. Extension of Family Resembling Uses.

Suppose that a child has been working with lists of words, contrasting the sounds of long and short "o". And suppose that whenever the child sounds a word incorrectly, he is corrected, and that at first it is quite random whether he says short or long "o", but gradually he begins to get them right. Was the child reading the words only after he began to get their soundings right? Or was he reading the words correctly only after he began to get their soundings right? The answer here, as in so many of the cases mentioned above, depends upon what we, for some policy reason, want to count as a case of reading in such a context. For, as was mentioned above, what counts as a case of "S read y" varies with what the context privileges as a minimal reading manifestation. The pragmatic extrinsic conditions allow a continual alteration of what conditions have to be satisfied for reading to occur and hence allow a continual variation of truth conditions. Wittgenstein pointed out the oddity of the question "Which was the first word he read", where, it is assumed that reading is taken to involve assigning a sounding which correlates with the word in some regular way and does not deviate beyond recognizability from the conventional sound correlation with the word. The difficulty is that, apart from some unreliable subjective report, there is no way of determining which sounding was the first to result from some regularized process for determining the sound (a regularized process which is not too deviant from the regularities most speakers of the language follow). What will count as a reading of the words varies with the objective. And by manipulation of circumstances we can gradually extend the class of things that will count as cases of reading.

It must also be possible to read and, in various dimensions, do so incorrectly. I do not mean only "misread", the way I read piano music, but systematically to do somthing wrong . For instance, suppose I have all the wrong ideas about how vowel sounds are made in Latin and about the sounding of certain consonants and consonant groups. So I roll out "Arma virumque cano ...." in my idiophones. Did I not read the expression? I certainly transformed the visual array of letters into corresponding sounds and did it in a regular way, a systematic way. Unless we are in some privileged context, this is reading, although it may not be the sort of reading a particular person has in mind. Suppose I have encountered some strange language which I have come to understand, though I have no grasp of its sound system and decide like some demented arabist to assign tones to the vowels as I read in the language. This is reading the language aloud. But not in the "usual" way; it is a family resembling process which is clearly seen to be reading once the similarity of the case to more ordinary cases of reading is noticed. By considering "odd" cases and noticing their resemblance to ordinary cases, we extend the use of "read" to cover them. That is how the family resembling uses were developed and how they are continually expanded. There is no inherent limit to further extensions and to further contrarie[illegible] truth-conditions because there is no necessity that all uses of a same [illegible] have any single thing in common.

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One may wonder about the point of my emphasis upon these "unusual" uses of "reading". (Though, these cases are not so unusual when we consider the proportion of classroom reading situations in which these kinds of reading occur and the proportion of experimental time devoted to exploring them). What is this supposed to tell us about reading in general? It is supposed to indicate: 1) that surrounding what we shall call the "focal" senses of "to read" there are various senses which differ in truth-conditions and differ in that way among themselves; 2) that there cannot be a general definition of "to read", either in the old-fashioned genus-species definitional form or in the contemporary truth-conditional form because there is not a common core to all cases of reading, a common core which is not part of processes which are not reading processes; 3) that there is not a simple continuum from minimal reading processes, characterized as decoding letters into correlated sounds, through "going from visual symbols to a form of language in which meaning is already inherent," to "extracting meaning from the array of visual symbols" to various forms of comprehension. There are variations at each "level" and the processes stand in no particular logical order.

Since we cannot arrive at a simple concept of "reading" which can both be defined by a single set of truth-conditions (which do not contain sets of disjunctive conditions which are exclusive and therefore vacuous), and since we cannot construct a general definition which would be applicable in all cases of reading, can we isolate some common focus of senses around which the other uses of "to read" seem to cluster, conceptually?

4. Focal Meanings of "to read" and their Salient Elements.

When we examine in ordinary language a large body of family resembling same-term uses, we can sometimes distinguish a sub-group of meanings around which the other meanings may be grouped either as contrasting uses with contrasting truth conditions or as elementary stages in an activity for which the central uses indicate mastery.

Similarly within the multitude of uses for the forms of the verb "to read" (taken transitively and allowing a third person singular past tense) we can distinguish some closely related uses with common salient features from those which are peripheral, ancillary or which name processes which constitute a part of or an approximation of some element of the focal reading processes. Moreover, these focal uses of "to read" are fairly close to the common sense notion that really reading involves understanding.

My designating one group of uses of a term as its focal meaning does not represent any absolute standard for "primary" or "focal meaning"; nor does it represent any hypothesis about the development historically of one sense from another. Rather, we simply notice the sorts of reading which are prized most highly both socially and institutionally and which appear to be the objective toward which reading education is directed; and we select the uses of the term "read" in the frame "S read x" (e.g. "The New York Times for last Sunday"; "the latest best-selling novels"; "an analysis of the presidential elections"; "a report concerning the narcotics traffic in costal towns", etc.), which appear to cluster together as representing the kind of thing upon which the educational process and the social rewards for reading are focused; that cluster of meanings, we call the focal meaning of "to read" and the other meanings, in which we speak of reading letters, reading nonsense syllables, reading aloud, reading to form general impressions, reading for correct grammar, etc.

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are regarded as peripheral senses of "to read". Whether it would be useful to sub-classify the common peripheral uses of "to read" into those which are ancilarry but prerequisite for the truth of statements which employ the focal senses, as distinguished from the "consequent" peripheral meanings of the same-term is based on normative considerations, further sub-distinctions may produce a facade of "system" which is without serious theoretical support. Rather, we shall profit more from noticing that there are a number of distinct senses of "to read" within the focal group; that the truth conditions for these meanings vary considerably among themselves but that there are certain common and salient elements which raise some interesting theoretical questions.

Very generally, the focal meanings of "to read" all seem to involve:

(1) perception
(2) visually stimulated;
(3) by an array of inscriptions;
(4) which are inherently meaningful
(5) of or through
(6) linguistic meaning.

In its focal uses, "to read" is generally an achievement term; that is, saying, "S read y" entails that something happened which really was "reading-y" and not just, say, the attempt to read y. Within the focal-achievement senses of "to read", we can provisionally distinguish the opaque from the transparent. All the focal senses of "to read" are taken here to involve perception which results from a visual stimulus of inscriptions which are inherently meaningful; but the question now is whether the perception is of the linguistic meaning or through the linguistic meaning, i.e. perception of something which is not a linguistic meaning. For instance, suppose Jones finds a note at his door from his girl-friend which says "Was here midnight; no one home; am leaving town." And suppose Jones, in reading the note, comes to perceive that his girlfriend is not telling the truth so that the conscious product of his reading is the belief "She's a liar". Now it is true that Jones would not claim to have read that she is a liar, but rather, would claim to have seen through what he read, that she is a liar. This seeing some state of affairs obtains through what is read is transparent reading; the seeing of what is meant, either affectively or congnitively, is the opaque sense of reading.

Rarely if ever is there reading in a purely opaque way. The pragmatic functions of reading are so much more elaborate that the social objectives of reading cannot be achieved with the reader's simple recognition of what is meant. There must be the production in the reader of some affective and/or cognitive states regardless of what is meant. And in some cases, more is required: in filling out a job application, the reading of "First Name" must be interpreted as the applicant's writing in his name. If the reader neither believes nor disbelieves, neither enjoys nor condemns, neither approves nor contemns what is meant, then there is not a characteristic linguistic output for the process. The characteristic result of a linguistic exchange between individuals is that both the cognitive and the affective states of the participants undergo some alteration, an alteration which is at least in part dependent upon the symbolic functions of the linguistic signal employed. And almost as frequently, a result of each exchange is some form of action or opposition to acting.

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We have been distinguishing two different sorts of reading which individuals may apply to the sentence "Lincoln was shot on Good Friday, 1864; in the "opaque", the reader understands what has been claimed but without taking up an epistemic or evaluative attitude toward what is asserted; in the transparent sort of reading the reader takes up belief, disbelief, uncertainty (or some other epistemic attitude), and probably an emotive attitude as well, toward what is meant; moreover, the reader may trans-perceive, over and beyond the message and come to know (or, perhaps erroneously believe) something about the speaker, writer or some other person. Or, the reader may trans-perceive in reading a question so that he formulates the answer. In classroon situations we tend to emphasize "what is meant" or opaque perception through reading when we are considering "comprehension" or "understanding", whereas in the important transactions of life, it is transparent reading that counts most, socially and institutionally. Understanding the basic directions on the income tax form will avail nothing if they are not followed; understanding the policy statements of candidates for office is vacant if the understanding is separated from shrewd estimates of personal reliability or credability. When we read a newspaper or magazine, it is not enough to grasp what is claimed or asserted or opined, this must be supplemented by attitudes of belief, disbelief, doubt, skepticism, etc., epistemic attitudes, occasioned by the interaction of what is asserted and our prior knowledge and belief. This is what is often termed "critical" reading. Thus there is, among the focal senses of "to read", a fundamental difference between the functional (critical) and the aesthetic (appreciative) kinds of reading. One does not usually read poetry or drama to acquire epistemic attitudes towards matters of fact, even large scale social facts, except where one functions as a critic. One reads for the acquisition of intellectual and emotional understanding. Functional reading, whether it be of signs on streets, of the N.Y. Times of professional texts or specialized reports, is for the perception of states of affairs symbolized and things beyond those symbolized. This claim is implausible when first encountered. But consider our reading of a book on the home repair of major appliances; in particular, our reading of a section on hot and cold water solenoids. What is our reading of this for? It is for our perceiving what is wrong with the actual machine and being able to repair it. The reading, functional reading, is for further perception; it is, in effect, to provide us with the cognitive units needed to make certain perceptual discriminations (knowledge of how a solenoid works and what differentially manifests failure to work) which we cannot make without these concepts and beliefs and which we need to be able to make for further goals (to be able to repair the machine).

So too, when you read to find out what sorts of changes the law permits in existing sewerage systems without a state inspection, the reading is for finding out whether in one's own case (or some case under consideration) one needs to seek state approval for what one wants done. The function of the reading is to provide a basis for a judgment (which is at least partly perceptual because it depends upon the appearances of things as well as upon what the books say) about a state of affairs (the permissability of certain acts in relation to the sewerage system) which is different from the state of affairs perceived in the reading (that the law says such and such -- which is only a premise of the practical syllogism needed to get a conclusion about the sewerage system problem). Similarly, when you read about allergies in a medical book, it may be for finding out whether you have hay fever; this reading is for further perception and it functions that way by providing cognitive units through which the perception is to be made. (Do I have a headache? A sore throat? Sinus pains? etc.). And the results of the perceptions are

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to be compounded, in the manner indicated by the book, into the judgment that one does or does not have hay fever.

But what shall we say of one's reading to find out whether Napoleon married Josephine? Suppose one comes across the statement in a reliable history: "Napoleon married Josephine, July 10, 1798". One not only perceives that it means that Napoleon married Josephine; one also finds out that Napoleon married Josephine. The latter knowledge is mediated by the linguistic perception of the statement's meaning and by one's general epistemic relation to authoritative sources.

Perhaps it is an error to speak of transparent perception in reading as perception of some state of affairs through the linguistic perception of what is meant; perhaps "linguistic perception of what is meant" is nothing more or less than formation of an epistemic attitude toward the state of affairs symbolized. That is, it may be misleading to postulate that there is a distinct thing, the meaning of the inscriptions, which is an object of perception; rather the linguistic meaning of the inscriptions may be the mode of presentation of the state of affairs symbolized; and transparent perception is perception of the actuality of the state of affairs symbolized, while opaque perception is simply apprehension of the event symbolized as presented, without formation of an epistemic attitude toward its actuality but with formation of affective states towards its actuality.

Talk about perceiving the meaning can thus be regarded as derivative from the experience of "opaque perception" and "opaque perception" is itself derivative from transparent perception. Hence, the meaning of the expression, as something which can be perceived without formation of epistemic attitudes toward the states of affairs symbolized, is a construction to provide an account of perception which does not have what is actual as its object and which is derived from such perception.

Our ability to do opaque reading is logically consequent upon our having learned, in the use of oral language for story telling and adventure spinning, to suspend epistemic commitment toward actuality and "to make believe". We have not, therefore, found a theoretically satisfying account of the relationship of opaque to transparent linguistic perception, though we have some leads and have found that the issues are the same for reading and for oral speech. There is an enormous difference between perceiving the linguistic meaning of the inscriptions presented in the visual array and perceiving some state of affairs through apprehension of the linguistic meaning of the inscriptions which form the visual stimulus. Yet both senses of "to read" are focal senses around which other senses cluster; except when listening to stories or poetry, we rarely accord to listening an "opaque" function by which we understand but remain epistemically dissociated from what has been said; and even with poetry and stories some judgments are found. So too with reading, the opaque sort of reading is restricted in its contexts; and it may be hypothesized that this sort of reading would not even be possible if the "transparent" reading were not already within our competence. Thus within the focal senses of "to read" we find inconsistent truth conditions; in one sense, a person reads a certain document only if he comes to form some belief about some thing or state of affairs symbolized; and in the other sense, the person may read even if he does not form such epistemic attitudes.

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Despite the differences among the focal, transparent and opaque, sensesof "to read", there is something in common: namely, that reading is a form of perception for which the stimulus is a visual array of inscriptions which are inherently meaningful and the object of the perception is either some meaning or something perceived through the apprehension of linguistic meaning. The output manifestations of the focal reading activities are thus characteristically linguistic; the expression of the resultant meaning-grasp or of some belief, disbelief, doubt or attitude acquired as a result of processing the visual array to an apprehension of its linguistic meaning. A person reading efficiently may be wholly unaware of any "apprehending of linguistic meaning" at all; for instance he may be reading a set of directions for reaching a certain place and the output of his reading may simply be his walking, as directed, following each sentence of the message. He may be aware only of following the directions and of the resultant physical compliants. The same thing holds for proficient instrumental readers of music. The visual inscriptions are processed directly into the motions necessary to produce their sound compliants without any stage of apprehension of their linguistic meaning in a reflectively conscious act of understanding. In fact, the performer can be so absorbed in his out-put of sound that he becomes entirely unconscious that he is reading; just as a person absorbed in a story may be unaware that he is reading, turning pages, etc.

Those salient common elements, despite their different arrangements within the focal reading activities, raise a number of interesting questions and at the same time allow us to place the inquiry about reading in a larger conceptual context. Reading involves perception, so what we know about visual perception in general is applicable. Reading involves apprehension of linguistic meaning and in some cases (perhaps the socially more important ones) perception of non-linguistic events through the apprehansion of linguistic meaning. Thus studies of linguistic meaning and communication through oral language are relevant. The array of inscriptions is said to be inherently meaningful, in contrast to morse code signals which are derivatively meaningful and to nonsense symbols which are inherently meaningless, even though there is a sense in which such symbols can be read . We must hook them into the function of inherent meaning and ask what consequences such a postulate has for our understanding of the various stages of reading skill.

Since reading is perception and all perception requires cognative units, studies on the formation and adaptation of cognative units are relevant, as are studies of developmental psychology which exhibit what natural order in cognative development there may be. Let us look further at reading as perception.

5. Reading as Perception

(a) Distinction of senses of "perceive". First we have to make clear that we are here using "perceive" in a sense which is broader than the sense in which philosophers have recently been accustomed to using the term and still somewhat narrower than the senses in which psychologists frequently use the term. For instance, philosophers will usually count as perception only those "takings" which occur as a result of sensory stimulation, involve belief and result in true belief; hence, perception is knowing through sensory stimulation, where "through" means "caused by". Only veridical perception is perception for most philosophers and all perception results in knowledge. Needless to say this is much too restrictive a sense for the term when we want to talk about reading as a form of perception.

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may be no beliefs about the visual array which result from the reading; for another, there may be false beliefs which result; and for a third, there does not have to be any belief at all. Certainly, there does not have to be any belief about the particular structure of the visual array. Yet the way psychologists use "perceive" is probably too broad, allowing in more than will be useful. Nevertheless, we can see that the focal cases of reading all involve perception as it is explained by Hochberg,[26] who emphasizes that perception lies somewhere in between those responses which are completely predictable upon the presentation of a sensory stimulus (and which are usually called sensations) and those responses which are no more predictable in the presence of a sensory stimulus than in its absence (and which are sometimes, and on account of their other characteristics called judgments). The perceptual response has the sensory stimulus as a necessary but not a sufficient condition. As I said, this is a little broad because the particular sensory stimulus of bold-face Gothic type may not at all be necessary for the reading response of the person who has read the message. Yet still, the idea is clear that there must be a visual stimulation, a set of sensations (of predictable responses for which the stimulation is causally necessary and sufficient) and there must be a response or output (which may or may not have an output manifestation) which is not accountable solely on the basis of the sensory stimulation but which is not accountable just as easily in the absence of the stimulation either. The same holds for reading: the response of the reader cannot be independent of the visual array; but neither can it be determined entirely by the visual array. There must be other factors involved. Hence, reading does involve perception in this broad sense.

But even in the narrower sense, which I now want to introduce, we have perception in all the focal cases of reading. For, I want to say that perception occurs only when the subject forms an epistemic attitude which is the result of his interpretation, via some cognitive unit or other, of a sensory stimulus. More precisely, to perceive is to form a behaviorally determinable epistemic attitude on the basis of the interpretation, via cognitive units, of some sensory stimulation. By "behaviorally determinable" I mean that the existence and nature of this attitude can be elicited in behavior, at least in principle, from a cooperative subject. "Interpretation via cognitive units" is simply judgement in some conceptual unit (or imaginative unit) so that the judgement can have an internal representation (probably either in a picture or a sentence or a model event). We want, then, to use the term "perceive" a bit more narrowly than Hochberg, taking only the subclass of those intermediate responses between sensation and judgment, which involve the interpretation of the sensations in cognitive units (concepts, images, etc.) and which result in a formulated attitude which is behaviorially testable and discriminable.

(b) Question concerning the objects of perception. In this sense of "perceive", "to hear", "to see", "to feel", "to taste", can all be used as perception verbs. But "to read" may be thought to go beyond some of these because it involves a visual stimulation, which "to hear" and "to feel" do not, and because it involves the apprehension of meaning which none of the others requires. But that would be unwarranted. There are, as we have mentioned, cases of reading which do not presuppose the apprehension of meaning on the

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part of the reader; and there are cases of hearing, feeling, seeing, tasting and the like which do presuppose the apprehension of meaning on the part of the perceiver. Meaning, yes; but linguistic meaning?

The fact that reading often involves the apprehension, or at least the attempt at apprehending meaning does not make reading sui-generis among our perceptive activities nor does the fact that it frequently involves the apprehension of linguistic meaning.

First a word about meaning in general. We can say that an object or event or state of affairs has meaning for a given individual just insofar as his perceiving it involves his actively coming to possess usable information concerning other objects, events, states of affairs or individuals. Meaning in general is significance and significance for a given individual is usable information concerning other things results. And we can, for this inquiry, further stipulate that nothing is counted as information which is not, at least in part, the basis for some belief (whether actual belief or only potential). Thus there can be meaning in an object in the sense of a "subjective but not objective" basis for belief, as when the visual appearance of the crystal ball is the subjective basis for the belief of the fortune teller but, presumably, is not an objective basis for any such belief. There can be "subjective-objective" meaning in things and events, as when the experienced woodsman bases his belief that a certain size animal has passed along a trail within a certain length of time upon the visual appearance of a broken twig which others in his party have not even noticed but which, if they did, would be meaningless to them. What something "tells" us about something else is as much a function of experience, skill, training, custom and attention as it is of the physical state of the object itself. And the meaning of something is what it "tells" about something else or some other state of affairs. We consider this case subjective-objective because the information is there, objectively, for anyone who has the subjective dispositions to process it; whereas this is to be distinguished from objective-objective meaning or significance, where the skill at interpretation is a commonplace and perhaps a necessary concomitant of adaptation to one's environment; for instance, the ability to tell from its recent positions how far an automobile will go in the next few seconds is an ability necessary for the survival of the city dweller; the position and movement of the car is full of meaning or significance for him about its future positions, and this is objective within the city-dwelling community, though it may appear atrange and subjective to a native of the wilderness. Perhaps more convincing is the example of the telephone ring. It means, objectively, that someone purposely or by error is calling that telephone number and expects (in a loose sense) an answer. This meaning is objective-objective in our society, though it might only be an objective-subjective in some parts of the world. As "the meaning" is more abstractly related to the stimulus which "has" it, it approaches symbolic meaning.

Besides the meanings of events, there are meanings relationships between or among meanings. For instance, if the pull starter of one's lawnmower breaks off in his hand, that means (given his other knowledge) the mower will not start; and that may mean that your lawn will not be cut that day. Thus the relationship of your finding the pull starter in your hand and your lawn's not getting cut is that the former is symbolic of the latter; the former means the latter.

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All perception of existential facts is perception via meaning, since an existential fact is more than the momentary appearance of things and is more closely attached to the abiding dispositions of things than their momentary appearances. (The contrast here is between "being red" and "looking red".) To see that something is alive is much more than to see it to be in movement; and yet the visual appearance may have presented only movement to the eye. The perception of life is the interpretation of the movement through certain cognitive categories which allow perception that the object is alive. The meaning of the event or thing is what it reveals, to a person who apprehends its appearance (sensory) through his cognitive units (images, concepts, beliefs, schema, etc.), about things which transcend its momentary appearance.

All perception involves the apprehension of meaning; all perception involves the interpretation of sensations in units which are not sensory but are, at least momentarily, cognitive (preconceptual or conceptual). That is evident just from the facts that the responses of the perceiver are not, like the responses of the senser, predictable given the stimulus and yet are not arbitrarily or unpredictably related to the stimluus so as to be considered irrelevant to it. Moreover, the tissue of perceptual responses is interwoven so that what one sees by way of one stimulus forms meaning relationships with what one sees in another thing.

Yet none of this perception of meaning, or, better, perception via meaning, involves the use of language (at least directly). That is, none of what I have mentioned is linguistic perception either in the sense that the perception is of something linguistic or that the perception is of something through the use of language.

Whatever perception is central to reading is certainly linguistic perception, in one or another of the two senses mentioned, at least as long as we are concerned with the focal senses of "to read". So, for our main consideration of the concepts of reading we shall consider only cases of perception of or through the symbolic function of particular units of language.

Reading is not the only kind of perception of or through the symbolic function of particular bits of language. In fact it is for most of us, subsequent to our having learned oral language and to our having learned to process language efficiently in listening and speaking. Nor is the sound-embodied language the only non-visual source of linguistic information; there are ancillary forms, such as pokes, looks, touches, rythmns, etc., which have whatever symbolic form they possess derivatively and yet, occasionally serve to convey linguistic meaning.

(c) Linguistic meaning. At this point it is natural for two reasons for us to stop briefly to consider the nature of linguistic meaning. First because we have said that certain kinds of reading are the perception of the linguistic meaning of certain bits of language (embodied in visible inscriptions); and secondly, because we have already indicated that in certain imporant senses of the term "to read", the visible inscriptions must have inherent linguistic meaning, and not be merely a code for some other embodiment of language which has its meaning inherently, as has indeed been suggested concerning the relationship of speech and writing.

A moment's digression is needed to inveigh against the naive view that because spoken language preceeded written language historically, the meaning or symbolic relations must inhere intrinsically in the spoken language and only

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derivatively in the written language. This is simply a form of genetic fallacy: reasoning from the dependence in origin of things to postulate corresponding dependences in the things themselves. From a physiological point of view, the aural stimulus is just as impoverished as is the visual stimulus. In fact, the visual stimluus is at least separated in space to correspond to word and thought unit endings (in modern printing) and several words are available to the eye in a single fixation; whereas, in sound, the words are separated one from the other; pauses do not coincide with the ends of thought units; there is not standardization of pronunciation as there is of spelling; there is not standardized inflection or a determinate rate of presentation and words uttered are not re-inspectable except with the aid of memory. From many points of view we could say that the auditory signal is more impoverished, when compared with the written one. Just in the matter of regularity, the written language tends to be grammatically complete, embellished with a careful choice of words, and semantically coherent, whereas spoken language is characteristically disorganized, grammatically incomplete and inconsistent, full of meaningless pause-words and other delaying mechanisms and utterances often terminate without the expression of a complete thought at all. Semantic organization abilities and linguistic search abilities are more heavily relied upon in the understanding of spoken language than they are, except by the fastest readers, in the interpretation of written language. The ability to extrapolate imaginatively and to complete what is unexpressed is more frequently needed in oral communication than in reading. Meaning is "read into" heard language just as much as into written language.

The words in these sentences do not embody meaning by standing in certain correlations with patterns of sound which have meaning inherently. The words have meaning by standing to one another in certain relationships which happen to be isomorphic to the relationships among their sound correlates. No word is a word all by itself, whether in speech or writing. No word has its meaning independently of the contrastive meanings of other words in the language.

Put most generally, the linguistic meaning of a word is the set of syntagmatic and paradigmatic relations (the combinatorial possibilities) its word-tokens have with the tokens of every other word.[5] Thus the identity of a word depends upon the identities of other words, determined by the combinatoral possibilities of all equi-form tokens..

A system of inscriptions is the written form of the language, if and only if the inscriptions are related to one another in such a way as to preserve the paradigmatic and syntagmatic relations of corresponding units of the spoken language. And vice-versa: a system of sounds is the spoken form of a written language if and only if there is a correlation of sounds with inscirptions, such that the paradigmatic and syntagmatic relations among the sounds are isomorphic with those of the correlated inscriptions. That is, corresponding units have the same combinatorial properties (e.g. exclusion, attachment, substitutiality, modifiability, etc.).

A fourth indication of what is meant by "linguistic meaning" is now required. First we must speak of "minimal linguistic meaning" and then of "linguistic meaning" which is minimal meaning augmented with "sense" and

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"referential" meaning for some elements of the language. Put most simply, minimal linguistic meaning for a unit of speech or writing which is capable of meaning and is freely variant, is its set of contrastive combinatorial properties with other such units. For example, it is essential to the linguistic meaning of "man" that it can combine with a single definite article preceeding it and with such completions as "is a male", "is alive", "is unwell". Whereas, "number" with a definite article preceeding it cannot combine with any of those sentence frame completions. Each of those completions is itself partly determined in linguistic meaning by the fact that it can combine with "man" and not with "number". It would not over simplify things to say that the first group of predicate completions have something in common in meaning because they can combine with one noun ("man") and are all excluded from combinin with another noun ("number"); and there will be still other things with which some sentence frame completions can combine but not all (e.g. "His wife"), from which their contrasts of meaning will emerge. The combinatorial properties of a term like "man" are simply all those regularities which determine which things it can combine with in the language and which things are excluded...it cannot combine with either syntactically or semantically. Part of the linguistic meaning of each word is the disjunctive sets of syntactical environments it requires.

(d) Do We Know What is Perceived in Reading? Now, if this is what linguistic meaning consists in, the combinatorial possibilities of freely variant meaningful units of writing or speech, then while it is possible that a reader perceives through some vague apprehension of the combinatorial possibilities of the inscriptions, it is certainly not likely that the reader ever does perceive the linguistic meaning or combinatorial possibilities of the words as such. The linguistic meaning of the words is not read off the page. Rather the meaning of the thought unit (sentence and the like) is construed from a prior grasp of the meaning of the words; that grasp is our knowledge of how to construe the words. In a theoretical way, we could say that to the combinatorial possibilities of a unit of speech there corresponds a rule of combination which a person learns when he hearns how to use the word; there is no harm in our thinking this way, provided that we do not hypothesize the rule as if it were some perceivable object.

Thus, knowing the meaning of a term is knowing how to use it. And clearly, "how to use it" is not what is perceived when we read a passage containing familiar words. Hence, when we speak of the reader's perceiving the linguistic meaning of what he reads, it is not this sort of linguistic meaning which is meant.

A word token on the page is the same word as some sound token, not because of the sound spelling correlation, even assuming that it is perfect, but because it has the same combinatorial possibilities in writing as the corresponding sounds have in speech. Elements of speech do not sound "like" elements on a page, they combine as do elements on the page. And neither in reading nor in listening are the combinatorial properties directly apprehended. They are, as we see in children learning to speak, extrapolated by trial and error in active "how to" or rule-making search.

Then, what is perceived in opaque reading and how is it related to what we have called linguistic meaning? In ordinary parlance, we say that it is "the meaning" which is perceived. But "the meaning" is clearly not the combinatorial possibilities of the constituent elements of what is read, for we

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acknowledge that that is not perceived as such. Yet "the meaning" which is perceived is somehow a construct from the combinatorial possibilities of the expression elements. How can that come about? The meaning which is perceived is "the symbolization", the reality symbolized. Evidently, the symbolic function of an expression is a resultant of its linguistic, sense and referential meaning.

Within "linguistic meaning" we have distinguished "sense" meaning which is sensation or other subjective states associated with the sound pattern or inscription pattern of the word; we have also distinguished "referential meaning", which we can call the designative possibilities of the expression, the appropriateness of using it to designate this or that thing. Not all words have sense meaning or referential meaning, not even all words which are not purely syncategorematic. But in ways which empirical linguists attempt to explain, the meanings of all non-syncategorematic terms which have neither sense nor referential meaning are derivative from the meanings of terms which have sense and referential meaning. The meaning which is perceived is the symbolization. Just as when I come upon a man sitting next to his lawn mower in grass six inches tall and holding a broken starter pull, I think of "no grass cutting today", giving to that state of affairs a symbolic meaning, so when I form similar ideas on perceiving the array of symbols, I perceive the symbolization. There is, so far, no satisfactory explanation of the nature of symbolic meaning; that is one of the reasons why the exploration of the distinction between opaque and transparent linguistic perception is incomplete. Nor is there as yet a satisfactory account of the relationship between the symbolic meaning which is perceived and the linguistic meaning, the combinatorial possibilities of terms and their sense and referential meanings. All we know for certain is that the symbolic meaning of expressions is a dependent function of the linguistic meanings of the elements of the expressions, and that the symbolic meaning is apprehended through the apprehension of the inscriptions or sounds whose combinatorial properties embody the symbolic relation. We need a larger scale conceptual analysis of meaning. For now, we shall try to get along with the provisional suggestions which follow. There is not a satisfactory theoretical answer to the questions concerning whether the sense and referential meanings of terms are prior to the linguistic (the combinatorial) possibilities of terms or whether the combinatorial possibilities determine, by restriction, the "sense" and "referential"meanings. Therefore, we shall not present our account in such a way as to have to prefer one solution over the other.

Whatever the logical order among reference, sense meaning and combinatorial possibilities, the three constitute what I call "linguistic meaning" in the full sense. This use of the term is broader than C. I. Lewis' use[6] which does not include either sense meaning or reference but includes within the linguistic meaning of a term in a given occurrence only those other terms which must be applicable if the given term is applicable. We need a somewhat broader notion because the complex idea which a person gets from understanding a sentence involves more than an appreciation of the combinatorial appropriateness of the terms, it involves ideas, reciprocaly modified, which attach to groups of words. What is perceived may be what is meant (that is, the specific state of affairs symbolized) or some misunderstanding of what is meant (some permutation on the state of affairs symbolized), but the linguistic meaning in any sort of strict sense is not perceived as such.

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To illustrate the difference between linguistic meaning and sense and referential meaning, consider some examples, "Cicero" and "Tully" have the same reference, they refer to the same individual but are not synonymous; so also do "twelve", "the sum of 9 and 3", "the product of 4 times 3", etc.; The latter terms differ in linguistic meaning because their sentential combinatorial properties are different; simply put, they are not substitutable for one another in various sentences and are appropriate only in quite different contexts.

What a word means is a function of what words can occur in its environment. What a word refers to (or can be used to refer to) is a function of its sense meaning and its combinatorial possibilities. It is conceivable that a person might learn by a careful study of a large supply of documents in an otherwise unknown language, what the linguistic meaning of every word is without knowing the sense or referential meaning of any. By compiling a rule, based upon extrapolation from the occurrences of individual words and the words they occur with, the person may find a general rule which indicates which environments of other words are acceptable for a given word; if he also devises some sort of completion rule so that he knows when an expression is complete and perhaps develops at least the rudiments of the grammar, then he can construct new expressions out of the words in his sample documents and do so without any forseeable limitation, despite the fact that the language has no sense (e.g. The kind of experienced meaning of "hot" or "red") meaning or any referential meaning for him at all. If the person understands both the sense meaning and reference of the terms that have such meaning and understands the combinatorial properties of the words, then he can understand the meaning of expressions compounded of such elements, even though the meanings of the elements undergo reciprocal adjustments through being concatenated together.

There is from a logical point of view no reason to suppose that meaning belongs to spoken language any more than it belongs to written language. There are units of the written language which concatenate on paper in the same relations that meaningful units of sound concatenate in speech. A word in spoken language is a freely variant class of meaningful allophones which stand in a distinctive set of paradigmatic and syntagmantic relations with every other freely variant class of meaningful allophones; and a word in written language is also a freely variant class of meaningful allographs which bears a distinctive set of paradigmatic and syntagmatic relationships to every other class of meaningful and freely variant allographs. Whether we want to say that the English word, say, "cat" is the union class of allophones and corresponding allographs having isomorphic combinatorial properties is not really important. The sound is not the word; the meaning is not the word; the array of letters is not the word; rather, the word is present in the sound and in the spellings, but not in every such case. For instance if a book began with "The sleep brown cat fled over the housetops", the mere fact that the allograph "sleep" which belongs to the orthographic type "sleep" occurs does not suffice for that word to have occurred; rather, we have here a misprint of "sleek". We shall not stop here to investigate how syntactical and semantical relations determine whether we have one or another word; if the expression is grammatically correct, we cannot have "sleep" in that concatenation. Occurrence of the graph is not sufficient for occurrence of the noun; nor is it necessary as is clear from the fact that in some contexts, omission of the inscriptions does not defeat occurrence of the word.

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At the very least we should be able to agree that it is unclear what is perceived by a person who perceives what is meant by a given written statement. Suppose this is what is written: "The Romans crossed the English Channel in galleys rowed by slaves". If it is properly read, is the reader supposed to perceive that the Romans crossed the Channel in galleys rowed by slaves or is he supposed to perceive that the writer claims that this is the case or is he supposed to perceive the state of affairs, in some epistemic limbo which requires neither belief nor disbelief? There are problems concerning the object of perception for the focal meanings of "to read", problems that are far less troublesome when reading, in its peripheral senses, is concerned with a simpler discrimination task.

What conclusion shall we reach concerning the objects of perception, for the focal senses of "to read"? First, that reading may be a way of finding out that something is the case (just as being told may be a way of finding out); even more so, reading is a way of finding out for oneself. Reading may be a way of perceiving states of affairs, just as hearing is, when what is read (like what is heard) in the context of other things we know indicates some additional state of affairs; e.g. that the writer is lying or that the writer is misinformed, or that he knows what he is talking about. But these are transparent uses of "reading". It is the "opaque" perceptions which are hard to describe; for it is "the meaning", which is perceived and we cannot in any satisfactory way say what the meaning,as a perceptual object, of the inscription actually is. Part of the difficulty may be in the way we use "perceive"; it is very easy, as can be illustrated with almost any word, to extend and vary the meaning of a term by repeated use in contexts having diverse qualifications and considerations. And that is exactly what has happened in the discussion of perception by psycholinguists, psychologists and educators; "perceiving the meaning" is not perception that ...., despite the fact that by asking about what is perceived in certain situations we naturally end by saying that it is the meaning which is perceived. It is true that in translating some Latin expression I may eventually perceive that "cimini sectores" means "hair splitters", but this is in contrast to the situation where I am reading, perceiving the meaning of what is written, but not explicitly perceiving that such and such is the meaning of what is written.

When we ask "what is the object of perception? What is it that is perceived in reading?", the grammatical form of the question naturally leads us to contrast, as if they were alternative objects, meaning and states of affairs meant. But they are not alternative objects. Their differences, while accommodated, are obfuscated by my speaking of apprehending the meaning and perceiving that one's friend is lying. For apprehending the meaning and perceiving the meaning are about the same thing, and are categorially distinct from perception through apprehended meaning.

One perceives what is meant, in the literal and straightforward sense of what is meant by the utterance (as distinct from what is meant by the utterer, which may be the very opposite) when and to the degree that the internal representation (whether in concepts, beliefs, imagination or abstract thought) of the message approximates the objective representation prescribed by the syntactical and semantical relationships of the units of the signal.

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Presumably, in the focal reading situations the reader interprets the visual array not in letter names or word names but in associated ideas and he understands to the degree that his complex idea is a representation of the idea embodied in the written text. If there is an internal representation in ideas or beliefs or images of what is meant by a text, then the visual stimulus, transmitted in optic neural impulses, must be interpreted. Contrasts within this signal must have significance for the perceiver; this can happen only if the contrasts are interpreted through cognitive units. And different readers can differ markedly in their reading rates only if the processing units are different. So we need to consider cognitive units and their functions.

(e) Formation of Cognitive Units and Their Function in Perception. There has been considerable investigation by developmental psychologists of the formation of cognitive units with detailed and interesting results in our understanding of child and adolescent development. An example of a cognitive unit is the idea (schema?) of "conservation" which Piaget has shown to be necessary for the performance of certain tasks and for certain kinds of perceptual discrimination.

In general, we can call something a cognitive unit which is necessary for a perceiver to have in order reliably to make perceptual discriminations of qualities which are not sensory contraries and at least in our culture, are considered objective differences in objects or states of affairs. Many of these cognitive units are culture-relative, many are skill-relative and many are interest-relative. For instance, the idea of a "beat", in the tuning of instruments is interest, skill and culture relative. Yet, persons well-trained can tell to within a beat or two how far from unison two strings are. A person without the requisite training, and sometimes even with it but without a naturally good ear cannot "count beats" and cannot reliably make such perceptual judgments. Yet there is no doubt at all that the discrimination is "objective" within the group of trained discriminators. Similar discriminations in colors, with respect to brightness, hue and intensity can be made by some persons and not by others. And in both cases, the results of the judgments can be independently checked by coherence tests with the scaled outputs of certain testing instruments.

Any concept which has an empirical application can be a cognitive unit in perception. For instance, if you know something about gasoline engines, the sound of the operating engine when interpreted by you in terms of the theory underlying the engine can lead to precise perceptual judgments concerning the "idle adjustment", "the power adjustment" and the like; these are perceptual judgments for which a person who has not those concepts would have no experiental basis whatever. It is in terms of cognitive units that otherwise meaningless sounds are the basis of perceptual judgments. For instance, the labored breathing of a patient may have minimal meaning for a laymay who can tell only that something is wrong; and his sense that something is wrong may be heightened by stethoscopic amplification of the sound; but he cannot discriminate dimensions of the sound which are apparent to a physician who, on hearing them, can determine specific features of the patient's condition. Possession of a cognitive unit (a kind of a perceptual set) may be a prerequisite for discrimination within the perceptual field and may be the basis for a judgment concerning the state of the patient's health. Thus a cognitive unit has two essential elements: (1) it is the subjective prerequesite for reliable discrimination of the presence or absence of elements of the sensory stimulus and (2) it exposes to the perceiver the objective evidential basis (through discrimination) for the resulting perceptual judgment.

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Reading, like all perceiving, is accomplished through cognitive units and as long as the cognitive units are minimal, such as letter discrimination features and names, the focal sorts of reading cannot be accomplished. But with more complex cognitive units, beliefs about the subject matter, knowledge of the world, grasp of the use of language, rich imaginative associations, and a variety of logically ordered concepts, reading can proceed in larger units. This, as is well known, is the only way we can account for the difference between the speeds of the accomplished reader and those of the beginner.

We do not have very much in the way of evidence at the neurophysiological level about reading. But we have enough, as Smith has adroitly shown us,[7] to keep us from making some very misleading assumptions; for instance, that the skilled reader fixates much more frequently and usually takes in a much larger area than does the beginner. One would naturally have thought that how fast one reads depends upon how fast one moves one's eyes. It is also sobering to realize that the information is coded in the simple yes-no patterns of nerve firings, with that pattern subjected to the extremely complex system of threshold stimulations and fatigue states of individual and grouped nerves. With the exception of certain predictions we can make about what would happen to one's reading ability if certain nerves were damaged, there is relatively little to know beyond such generalities as Smith and Hochberg[8] have already observed: that the brain directs the movements of the eye, that peripheral vision may be extremely important in saccade [illegible]-length determination; that there are time limitations upon the processing of information and that, logically, if more information is processed in the same time it must be processed in "higher cognitive units", and that, still, the unit from which all the information arises is the array of letters on the page, the same set of discriminable "features" which is there before the illiterate, the beginner, the college student, the expert and the speed-reader. The discriminable features are there in the array. But that does not mean that everyone can discriminate those features. One needs a certain way of looking at the array to discriminate its elements. That "way of looking" is a cognitive unit. The featural discriminations are objective-objective in our society, since most persons can make them and all consider the distinction to be objective in that they are person-independent in the stimulus. Other contrasts within the visual array, noticed on the basis of correlations of letter contrasts and thought units, may be considered objective-subjective; that is, they are objective because they are really on the page, but subjective because their discrimination as contrasts of meaning is not available to persons who have not associated such letter contrasts with thought units in contrast. This is, so far, somewhat like Smith's theory.[9]

Yet there are questions raised by this hypothesis. We need some explanation of how the cognitive units come to be attached to the verbal symbols (especially if we reject as more than a temporary expedient the "decoding to speech" account) and of how the cognitive units come to be adapted from their function in processing auditory language to the activity of visual perception.

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Attachment and Adaptation. These are problematic relationships. How cognitive units are formed is not well understood either, but at least we have the Piagetian and similar developmental accounts of how they come about and we have every reason to believe that something like assimilation and accomodation are generic processes which gradually lead to the formation of new cognitive units. If Piaget is right about the necessity for a cognitive reorganization at each developmental stage,[10] does the adaptation of linguistic abilities to visual stimuli require cognitive reorganization? If it does, why do we not teach reading by following the pattern of organization through which the language was acquired in the first place?

So let us start with this problem: what is the difference between a cognitive unit and a "meaning"? First there is a difference of function. The function of a cognitive unit is to permit and serve as the basis for a perceptual or judgmental discrimination: to uncover the evidential basis (by partitioning the perceived or the thought-about) for a judgment (perceptual if based on sensation and conceptual if only intermediately based upon sensation) that something does or does not actually obtain in the world; for instance, that two strings are or are not in unison; that two wines are or are not equally heavy; that spots on the horizon are or are not mallards; that a particular engine is or is not receiving too much fuel and too little air. Cognitive units are the vehicles for discrimination in judgment, vehicles without which there could be no experienced evidential basis for the judgment because the evidence would simply not be available to the perceiver or thinker.

Meanings are of various sorts, linguistic, referential, sense, associative, connotative, emotive, and so on. There are meanings corresponding to cognitive units; but there are meanings which are complexes of cognitive units as well. Meanings are functions; they can only in the loosest of senses be said to differ in function from cognitive units because cognitive units have functions but are not themselves functions belonging to anything else; whereas, meanings are functions of units and complexes of language and, sometimes, by analogy, of natural objects and events and cannot be said to have functions except instrumentally.

Just as "wrenching" is the function of certain tools and "wrenching" can be said to have, instrumentally and accidentally, various functions (e.g. to assist us in putting certain pipes together), it does not of itself have a function; so too "to see" and "to mean" are respectively, the functions of different things and do not by themselves have functions, whereas "cognitive units" are like tools, so that a particular cognitive unit has a function, "discrimination" or "contrast creation", just as a wrench has the function of "wrenching"; that which is a function is categorially different from what has the function. Thus there is a categorial difference between cognitive units, which are units of organization of thought (and may have a physical correlate in units of brain state organization and interaction) and meanings which are functions of linguistic entities (and some natural entities) in interaction with a perceiver capable of cognitive activity. There cannot be meanings unless there are perceivers with cognitive units because it is a necessary condition that for things to have meanings there must be cognitive units in which discrimination, based upon such relationships to other things, can be made in perception and thought.

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Having made that distinction between meaning and cognitive units we may now ask how cognitive units become attached to visual arrays of symbols and how adaptation of the cognitive units in which heard language is processed comes about to facilitate the processing of written language.

Attachment. What does attachment consist in? For instance, are the cognitive units of "causal relation, causal irreversibility and time-precedent of cause over effect" attached to the words (to the meaningful sound-tokens) in which someone says to a child "Johnny ate the last of the cookies. Was there a cookie left for Jane?" It seems that not. Rather, those cognitive units seem to be units of thought organization, almost like pathways, so that if the child is about to respond "Yes, there is a cookie left for Jane because the mother said for Johnny to leave one for Jane", that pathway will be blocked; and cognitive units also seem to function like gating devices which open if there is a certain "thought pressure" and therefore control the thought paths. For instance, imagine that there is a certain pressure for the child to provide an answer and to give a reason for it, perhaps because of some offered reward. The cognitive units, at least of the sorts mentioned, are not attached to the words but are channels through which the meaning of the words is processed. But perhaps these are "formal" cognitive units and there are material cognitive units which are, like concepts, simply attached to verbal signs. For instance, "equal-sided" is a cognitive unit in terms of which perceptions of sameness and difference are possible concerning various otherwise different figures and without which no well founded judgment that they are the same would be possible (apart from much more elaborate ideas as "Euclidean plane figure", which however might not exclude some figures, as required.) There are words for various cognitive units and, therefore, cognitive units are the meanings of (what is meant by) certain words; but that does not make cognitive units into meanings or meanings into cognitive units; though it does indicate a correspondence which may be useful as part of the explanation of symbolic relations.

First-order cognitive units are simple concepts, simple abstractions; second-order cognitive units are logical and causal relationships among concepts and correspond to logical and natural law-like regularities. There are higher-order cognitive units cannot be doubted. In fact there are cognitive units corresponding to each kind of abstraction and each level of logically distinguishable generalization which we can find in thought. A cognitive unit is like a switching device, combining and separating thought stages into further thought stages. It is easy enough to imagine the neural correspondences to cognitive units as dispositions of the neural network to proceed immediately from one neural configuration of excitation to another, having a definite pattern in relationship to the first, though that pattern (given the preceeding fatigue states, thresholds, etc.) may not be easily observed to be related to the first except through prior understanding of the pattern. Thus we do not want to say in general that cognitive units are not attached to words but rather that first order cognitive units are attached to words and that higher order cognitive units (while, as designata, attached to the words that name them) are not attached to words but are attached to the meanings of words or to concepts. So we still have the question of how the concepts are attached to the words.

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But then we realize that as Wittgenstein observed in the Blue Books that there is something wrong with that sort of question.[11] For the words are meaningful verbal symbols; meaning is not attached to the word, it is constitutive of the word. Meaning is attached to the perceptually discriminable inscriptions (though we must keep in mind that some parts of inscriptions are perceptually discriminable only in so far as we take them to differ in meaning: read, read). Now what does it mean to say that meaning is attached to the perceptually discriminable inscriptions?

Well, what does it mean to say that meaning is attached to perceptually discriminable sounds? Especially, what does it mean in light of the fact that the perceptual discriminability of the sounds is itself dependent upon one's ability to attach meaning to them? Wittgenstein was more than close to the truth when he observed that the meaningfulness of the sound consists in its having a use; for the differential meaningfulness of sounds consists in their contrastive use. And the same sounds can have different meanings which are not usually confused because they have contrastive uses which are in accord with contrasting rules of concatenation.

The developmental studies of children's language indicate that sounds have meaning for children just in so far as they can use them to express feeling, desire, instigate action, evidence replies, and generally, interact with other persons.[12] So too with written words; they have meaning in so far as they have a use. That their use may be accessible to some children only by a painful correlation of the inscriptions with sounds which already have a use and through which the word as written is recognized does not show that the meaning of the inscription consists in its derivation from correlated sounds. Correlation may be for some children the means of access to the differential uses of the inscriptions as linguistic entities; but the use is already there inherently in the objective combinatorial possibilities of the inscriptions within the language.

Some individuals, almost miraculously, discover the contrastive meaningfulness (the contrastive combinatorial regularities) of certain inscriptions without the correlation process or with only minimal dependence upon it. They already know the language and succeed in transferring from auditory to visual forms of the language without an item by item correlation. We, naturally, want to know more about this process because it is direct "learning to read," and we want to know how this can be done without the sort of interaction with persons which goes on in the early learning of language.

How is the adaptation of skills from one kind of sensory input and output to another brought about? Not much is known about this, though there have been some studies of adaptation and of skill development and decrement. This is one of the theoretical areas which need further exploration.

For now, let us review the results so far. First we argued that the perception in reading must go on through the use of cognitive units which are criteria of perceptual discrimination. That raised the question of whether the cognitive units are attached to word tokens (verbal inscriptions or sound events); there are varying levels of cognitive units, of which only the first level attach to individual words, (although almost all cognitive units have verbal names). We then asked what attachment of a cognitive unit to a

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sound or inscription consists in and we found that it consists in the symbols having a differential use, differential combinatorial regularities in relation to other such verbal symbols. It is vague and inaccurate to say the use attaches to the word; rather, the inscription pattern is a word just because it has regular differential combinatorial possibilities; and it is this or that word just because of its particular differential combinatorial possibilities in relation to other words. That disposes of the first question and raises the second one: how does the use which a certain sound pattern has, come to be adapted so that some inscription pattern acquires the same use, in relation to other inscriptions. There is no theoretical difficulty about the sameness of use because, as we suggested earlier, the inscription class is the same word as the sound class if and only if it has isomorphic combinatorial properties. The question here is only about the adaptation of our ability to recognize and employ the word by way of its visual appearance. That we recognize words in speech (in the senses discussed in the section on word-recognition, below) cannot be doubted. Somehow that ability is adapted to visual stimuli. How? For a detailed answer, there may have to be further investigation of the general phenomenon of skill adaptation, something which we can't undertake here.

(f) Consequences of the Analysis Up to This Point. We find that "to read", taken as a transitive verb which admits of a third person past tense form, "S read x" is not univocal; that its meanings vary with the categorial contrast of the substitutions for the direct object. Secondly that, even where we keep the category of the substitutions invariant, the conditions for truth of an assertion of the form "S read x" differ with the output manifestations employed as tests and that the sorts of things that count as reading (and therefore the sorts of things which satisfy the truth conditions for "S read x") vary in accord with standards imposed upon the reader through teacher, educational objectives, education theories, stages of instruction, and large scale social and institutional objectives. "To read" is therefore not one process, and does not have one sort of output or one sort of output manifestation. There cannot, therefore, be a general definition of "reading".

Secondly, we find that, once we observe that there are many special-purpose senses of "to read", some of which are used to describe incohate stages or elementary stages of other processes and others which are adapted for special situations (proof-reading, e.g.), we can isolate by way of our general understanding of the social objectives of reading, certain focal senses of "to read", uses of "to read" around which, though they differ among themselves, the widely variant meanings tend to cluster either as terms denoting prerequisite processes or product processes. Although there is no firm demarcation of the peripheral from the central or focal meanings, the large scale objectives of reading and the investigations so far carried out indicate that there are certain salient (not essential) features of those uses of the word. The truth conditions for these focal uses of "S read x" all seem to involve: (a) perception; (b) on the basis of visual stimulation; (c) by inscriptions which belong to a system of inscriptions; (d) which are inherently meaningful; (e) where the perception is either of or through linguistic meaning. Further analysis suggested that there may be no such thing as the simple apprehension of linguistic meaning with no other product; that, perhaps, there must always be an output (not necessarily behaviorally manifest) of behaviorally discriminable epistemic, imaginative, associative or emotive states. And if the output is achieved through the apprehension of the linguistic meaning of the text and bears at least a "controlled" relationship to the inherent meaning of the

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inscriptions which constituted a visual stimulus, the output is a reading output.

Thirdly, we find that we cannot account for these conclusions unless we consider written language to have as much inherent meaning as spoken language; and so we are led to inquire into linguistic meaning, and to ask, in greater detail what is perceived in reading. That broadens the inquiry, enabling us to ask what reading has in common with perception in general. And the common element upon which we have placed most emphasis is the processing of the sensory stimulus through cognitive units, which, we then explained, function as prerequisites for perceptual discrimination. Since it turns out that there are many sorts of cognitive units, we asked how cognitive units are related to perception through language, not just written language but spoken language as well, The answer seems to be that cognitive units form a system of ascending generality, with the first level belonging directly to those units of language which have both sense and referential meaning and consisting in their differential combinatorial possibilities. Higher cognitive units seem to be abstractions from first level units and abstract relationships among such units. Thus the cognitive units have relationships to written language which parallel the relationships of the cognitive units to spoken language.

At this point, it is useful to return to our early criticism that it is misleading for writers to contrast the scanning of adult and experienced readers with the unit by unit processing of beginners, saying that the latter sample and the former consider all the information available and perhaps become overloaded with useless information. For just as all perception proceeds through cognitive units, so all perception is a sampling process; this is especially true of the accomplished perceiver because he cannot possibly process the momentary visual nor auditory signal through every cognitive unit he has at his disposal but must select among possible processings.

It is easy to underestimate the fact that a normal child is also an accomplished perceiver, and by the time he starts learning to read, already has a substantial stock of cognitive units, many of them acquired through his mastery of spoken language. All his perceptions of the enviroment are "samplings" through which parts of the available sensory stimulus are developed to beliefs, and the like, while large parts of it are ignored. In terms of the visual information available in the four or so eye fixations per second, a child's glances around a room are usually directed by his thought states and are coordinated as part of a searching process for the information which is required for the application of the cognitive units which his emotional and cognitive state at the time put into readiness. That is, even with small children, the visual scan is not haphazard; and the input of excitation to rods and cones is not randomly processed but is interpreted in a variety of prior patterns, which makes his perception of the visible world just as much a sampling or a scanning as the accomplished reader's fixations on the printed page. Even with the unpracticed beginner in reading, it would be incorrect to assume that his visual processing of his laborious letter by letter search is any less a sampling than the accomplished reader's perception. After all the child is looking at letter shapes or the like and not taking into account

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slight variations in type darkness, slight differences in type height or alignment, the fall of shadows on the page, the number of times the same letter has occurred, the color of the letters and other extraneous information which is actually available to him from the same visual input.

Everything we already know about how perceptual sets and cognitive units affect perception can be applied to flesh but what is here asserted concerning the cognitive control of perception. And since we have a general idea of what cognitive units consist in, what word-recognition consists in (see section below), further investigation of skill adaptation (of which the Piaget developmental theory offers many illustrations), may explain how recognition skills are adapted from spoken to written language.

(6) Word Recognition

The discussion of word recognition and word identification follows the same steps as our discussion of reading. We indicate by exhibition analysis that there are differing uses and meanings with different sets of truth conditions; and that the applicability of various truth-conditions depends upon pragmatic contexts, just as the varying truth conditions for reading do; that there are "extreme" uses of the term which are far from the senses one would before analysis expect, although they can be easily seen to be extensions of other meanings to diverse contexts and are just as easily and automatically understood as are the more "normal" senses of the terms; that there are "focal" and peripheral senses of "to recognize" a word and "to identify" a word, which we can separate from one another in terms of the objectives of the enterprise of reading. The "salient features" of the focal senses range over reading and listening and speaking contexts in which word recognition is appropriate and reinforce our hypothesis that reading abilities are not specific. Lastly, we answer the question "Do you read words when you, an adult and skilled reader, read a text?" This answer is based upon the observations already made concerning the falsity of the contrast between regular reading and scanning or sampling and the earlier problems concerning what is perceived reappear. We began with some remarks concerning the ambiguity of the word "word" and the relationship between words and their phoneme-grapheme expressions.

Word identification, like reading, is different things under varying contexts. In some cases a person identifies a word if he gives the sound (more or less correctly); in other cases he identifies the word if he gives the meaning more or less correctly; on others he identifies a word if he simply finds it among a scramble of letters. Every one of these behavioral manifestations is defeasible; the manifestation is sufficient evidence that the word was recognized, provided the causal chain from the visual stimulus is intact and there is no other sufficient cause of the output. That connection can be interrupted in many ways. One of these manifestations of word recognition is a necessary condition, except in artificial pedagogical situations which, in effect, pragmatically and persuasively redefine what we mean by word recognition.

The rough and ready standard many of us would offer for a word is some - thing like: a symbolic unit with a cannonical graphic representation (given by a dictionary) which when correctly written or printed occurs surrounded by

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white spaces. But no one would say that that is what we mean by "word". The linguist's concept of a minimal free variant unit of meaningful sounds or inscriptions is a lot closer to what we mean by "word", though it has some counter-examples in common sense because we consider the linguist's morph "come in" or "come on now" to be composed of two or more words. It is natural initially that we should suppose that the units on a printed page correspond to distinguishable units of spoken language though certainly not directly since even educated persons do not speak with the syntactical and semantical regularity and completeness which we have come to expect from the printed page. Yet the supposed correspondence is harder to explain than one would expect.[13]

From a physiological point of view, there are some notable similarities and some notable differences between written and spoken language. For one thing, while the accoustical signal comes to us over time and is not segmented into words with time spaces between them (as occilliscope studies have shown) but comes with spaces within words and with whole sentences connected together in unbroken sound signals, words on a page are spatially segmented yet so arranged that more than one can be perceived at the same time. As Frank Smith has pointed out[14] there are other interesting comparisons to be made, comparisons which indicate that unless we consider referential, syntactical and semantical relationships as well as phoneme-grapheme correspondences, the correlation of written and spoken language is inexplicable. As has often been observed, in listening to a foreign language, it is impossible to distinguish the word-units (except of course, for trained empirical linguists) without employing meaning units; we have to understand the language in order differentially to perceive the words as units. Regardless of the language, if it is in our alphabet and printed according to our conventions, an adult has no such problem with distinguishing the units on a page; but of course there is a problem for a child, because he has to learn what spatial differences make a significant difference in reading.

William James observed, not just any difference makes a difference. And this is particularly true in reading, speaking, and hearing. Hence, as Smith has hypothesized, the task of learning to read consists to a considerable extent in learning which contrasts which can be visually observed are relevant to the objective of reading. But Smith has not sufficiently emphasized that what contrasts can be visually observed is itself a function both of one's knowledge of the language and of one's stage of skill in reading. The contrast of "come in" and "come on" is there on the page to be visually observed; but unless the reader has the diverse concepts and a use for the diverse concepts, he will not recognize the difference in the inscriptions as whole units because the difference will be insignificant for him.

Some explanation of this point, which I consider to be basic to an understanding of reading and somewhat different from Smith's main point (though not antithetical to his) seems needed. It is one thing for a child to be able to say that "come in" and "come on" differ by one letter and to indicate that it is the first letter of the second word. It is quite a different thing for a child to say that they differ in meaning, that "come in" is a direction to enter a place where someone is supposedly already present, whereas "come on" is (apart from its slang meaning) an expression indicating either impatience expressed in command to follow or a simple command to accompany

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someone else or get on with one's project and therefore differs materially from the same expression "come on" followed by a noun phrase such as "the plane" where "on" concatenates with the noun phrase and not with "come". Now the point here is that the difference in one letter, joined with a suitable absence of a noun phrase properly placed after "on", is a sign of the meaning difference between the two phrases. But it is a sign of meaning difference which is observable as such only by a person who already has the contrasting cognitive units.

It would be naive to think that just the difference of the "o" and the "i" is sufficient to make the difference in meaning between "come in" and "come on"; for there are cases when despite my mispelling, putting the "i" instead of the "o" or vice versa, there would be no difference in what is meant and no doubt or confusion about what is meant; therefore, it is quite wrong[15] to think that to each difference of a letter there corresponds a difference of meaning, or that where there is a relevant letter contrast there is only a single contrast of meanings. The differences of letters are not related so simply to differences of meanings, though they are signs of meaning contrast. There are also certain syntactical and semantical conditions which must be fulfilled for an unambiguous contrast of meaning to occur. The expression "The physical force was calculated" is ambiguous when not provided with sentential or discourse contexts which would tell us whether we are concerned with physical forces like gravitation or physical forces like hitting people (police brutality) or a physical force (like the corps of physicists needed to work on a space project) and whether the calculation amounts to forethought and premeditation or measurement or estimation, and the like. There are differences of meaning which do not correspond to letter differences but do correspond to word-concatenation differences, and there are differences of meaning which, while indicated by letter differences, presuppose also the absence of certain other expressions or the presence of certain kinds of expressions or of certain kinds of word concatenations; thus, certain letter contrasts (even single letter contrasts) may be sufficient indicators of meaning contrasts but defeasible indicators; that is, they are sufficient provided nothing else is present which puts them out of business; and syntactical and semantical necessity can cancel out letter contrasts. In some cases, difference of letters is a necessary condition for difference of meaning, but again defeasibly; for the fact that, in certain contexts, we misspell "affect" as "effect" does not change the word which is present, since there is only a misspelling of the word which ought, on the basis of semantical concatenation, to be present. But in other contexts, that difference of a letter, regardless of the semantical concatenations which are in the environment is sufficient to cause a change of the word presented and therefore to cause the presence of an error or the correction of an error.

What happens in the presence of certain letter contrasts is not settled by semantics and syntax alone but is partially dependent upon the intentions of writers. The fact that the printer sets "effected" where I put "The war affected prices" does not determine that the sentences says "effected" but only that it appears to say that. Even if you hold the opposite view, you must admit that there are extrinsic pragmatic considerations which condition the sufficienty and the necessity of the semantic and syntactic and even the spelling conditions which are the basis for contrasts of meaning.

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Ignoring pragmatic considerations, matters of intention, misspellings and the like (which is no small thing to do), we find that we still have to take as very important the concatenation of words, semantically and syntactically, in speech particularly indicated by the supersegmental phonemes; for what meaning contrast is indicated is often dependent upon how words are collocated and therefore on how a previous or subsequent sentence is understood; thus, the resolution of ambiguity in the semantics and syntax is itself dependent upon the grasp of the meaning.

Returning to the main point now, we recall that it is one thing to notice the difference in spelling and to be able to tell what it is; it is quite another to see the expressions as meaning units which are in contrast. That is, once the child has the ideas, the contrasting ideas of "coming in" and "coming on", he may be able to recognize the meaning contrast of the visual units on a page. What counts for S as a visually observable unit depends, (provided there is sufficient information in a single eye-fixation to provide basis for the perceptual judgment in the presence of the other information a perceiver might have) upon the kind of cognitive unit the reader is using to process the visual stimuli. Thus, looking at a crow if the only relevant "programs" are my searching for Indians, Chinese and Blacks against the sepia-peach background of "whites" at a football game, all sorts of information and clues for judgments about whether pairs of individuals are present as "couples" will be left unprocessed. What is perceived (what is perceivable for S) is a function of the cognitive units which are in readiness for the processing of the visual stimulus (which is, considered as a unity formed over time, itself a function of one's interests, expectations, desires, states of alertness and accidental associations -- not to mention subconscious associations). For the units to be in readiness they have to be possessed. That is, concatenation of elements of the visual array is dependent upon the meaning units possessed by the reader in the form of cognitive units; and for a reader who "knows" oral language well, that means that visual discrimination is dependent upon the state of adaptation of his cognitive units for processing speech to the processing of visual stimuli. Just as some of Piaget's experiments show that successful discrimination of embedded figures is dependent upon the ability to formulate verbally one's search objectives,[16] so the visual discrimination of the beginner is dependent upon his adapting his cognitive units to the visual modality, by finding in the visual signal those contrasts which parallel the contrasts he has recognized in the auditory signal.

A distinction may be perceptually objective and still not available to a certain perceiver because he does not have the cognitive units necessary for the discrimination. For instance, there are objective differences, both in structure and in appearance between thatched roofs made of flax, wheat, barley, oats, rye, and rushes, just as there are objectively perceivable differences between thatched roofs which are held together by ropes and stone and those which are held together with interlayers of sea shells. But unless one has had the experiences which would lead to the development of the appropriate cognitive units, one cannot by looking tell these differences.

Some cognitive units are craft-bound in that one cannot make perceptual judgments which result from such discriminations unless one has achieved a certain stage of skill or mastery in the craft; thus certain decisions about the quality of violins will require skill in playing the instrument. One acquires the cognitive units by an experiental initiation into the community

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of craftsmen and forms the ideas as a result of learning, in part to talk the way the craftsmen do. Observation within a craft is partly a function of the craft-bound discourse. To confirm this, one needs only to listen to tinsmiths discussing gutter construction; dry wall builders, selecting stones; carpenters, talking about the spacing of white cedar shingles. The perceivable differences to which they refer are not observable to the uninitiated. Critical appraisal is based upon perceptual discrimination. But the discrimination itself depends upon one's possessing certain cognitive units through which the discrimination is possible. The cognitive units are frequently acquired through one's participation in a discoursing and experiencing community which reflectively appraises its experiences. (Fishermen; tennis players; musicians; well drillers; builders).

It is just as certain that linguistic perception through the auditory signal is schematic and based upon syntactical and semantical concatenations of elements and upon projections of elements not apparent in the signal, as it is in the case of reading. In addition to the cognitive units being possessed, something has to clue the reader into processing the stimuli in higher, rather than lower units; by "higher" in this context, I mean units less closely associated with the particular form of the visual stimulus than others. This raises questions concerning motivation, biases, thought habits and general intelligence which cannot be resolved here, though there is an indirect resolution at hand; if a beginning reader does not process the visual array in the same sorts of cognitive units in which he processes the auditory array and the latter is efficient, then his state of adaptation of general linguistic abilities to the visual stimulus is deficient. We at this point have to eliminate as possible causes, defects in the visual array itself, general "field" defects which will make processing inefficient and even incorrect (like direction confusions, inability to get convergent images, etc.) and the possibility that we have out-put problems (though that is unlikely if we already know the child's linguistic ability is good). It may at that point help to conduct exercises in semantic and syntactic anticipation, in word collocation, etc., to induce an adaptation of the general skills to the visual array.

It is from a theoretical point of view, correct for Smith to refer to certain grammatical and syntactical regularities which particular textual arrangements of inscriptions are instances of, as being redundancies within the text,[17] provided the meaning contrast in the particular case is already sufficiently manifest from the letter configurations or other sources of information. But in fact, in most cases, the syntactical and semantical configuration is not redundant since its presence is a necessary condition for the resolution of ambiguity. And it is incorrect to account for the reading of the skilled reader as an effective use of the redundancy inherent in the text since whether the text is redundant for a particular reader depends upon his using cognitive units which overlap in the perceptual judgements they justify. There is, then, a kind of word recognition -- recognition of a word as an inseparable element of a first order cognitive unit -- which can be accomplished by differential visual discrimination of only a few letters from a complex visual array, because those letters are sufficient to trigger the formation of the specifically differential idea which would be appropriate given the ideas already derived. This sort of reasoning will also explain the partial subvocalization of skilled readers in those cases (for which we have no empirical differentiating test at the moment) where the subvocalization is not an auditory-muscular reverberation of the idea but is rather a triggering of the idea by partial correlation of the visual array with inner speech.

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Just as we do not discriminate every sound of the distinct expressions which we recognize and understand in speech (as is made evident by the fact that sometimes we cannot slowly and distinctly repeat an unusual word which we can on hearing distinguish and understand), so we may sometimes sound-correlate just enough of beginning and ending letters to trigger the whole concept unit for a string of words. In fact, it seems apparent that this is how some people read characteristically, whereas others do not experience the "inner speech" phenomenon, except when reading text which is difficult and for which the inner speech correlate is an aid to keeping the whole in mind.

With these introductory remarks, designed to call attention to the dependence for a given person of what is visually distinguishable within the visual stimulus and thus the dependence of what is capable of leading to differential perceptions, upon the person's already possessing appropriate cognitive units, we have laid the groundwork for the discussion of word-recognition. As a final and I hope persuasive illustration of how cognitive units function to construct perceptual units (differential or contrastive units of visual perception), consider the following two expressions from propositional logic: (a) $[(p \supset q) \cdot (R \supset S) \cdot (pVR)] \supset (qVS)$

(b) $[(p \supset q) \cdot (R \supset S) \cdot (-q\ V\ -S)] \supset (\ -p\ V\ -R)$.

Unless one has the concepts "or", "and", "not", "if then" and the concepts of parenthesis units and bracket units, one cannot read or understand the expressions. It is in only a minimal and inappropriate sense a "reading" of the expression to spell it out as "left bracket, left parenthesis, small p, small v, small q, right parenthesis," etc. Without the appropriate concepts a person would be totally unable to indicate how many meaning-units are present in the expression. A child is in exactly this position when he confronts a written text when beginning to read; for he does not know which of his meaning units are even appropriate for processing the text. All perception, as distinct from sensory stimulation and sensation (where output is determinate to input) requires interpretation; and all interpretation, which is not based upon the instinctive units more frequently found in animals, requires cognitive units. A theory, such as Piaget's, of the developmental acquisition of cognitive units is thus essential to the empirical understanding of perception and therefore of language (both written and spoken).

(a) The Information Theory Conceptual Scheme. Frank Smith has made inventive use of the information-theory conceptual scheme, especially of its central notion of reduction of uncertainty, in his general account of the reading processes of both beginners and skilled readers. However, it seems that the "reduction of uncertainty" conception, despite its inherent power, has been somewhat strained, particularly because uncertainty can be reduced to zero by various kinds of errors (such as a fairly complete misunderstanding of a passage) so that the kind of reading which is going on corresponds to the kind of uncertainty which is being reduced. In fact, however, for the skilled reader, "uncertainty" as a psychological state concerning individual words is a relatively rare phenomenon when he is reading material which is easy for him; and when he is reading material which is difficult but in a language which he has under full control but is, say, a psychologist trying to understand a legal document, his uncertainty is not concerning the identification of the words but concerning the peculiar way their meanings are concatenated in the light of background rules of law with which he is totally

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unfamiliar. He may succeed in reducing his uncertainty to zero but at the cost of completely misinterpreting the document to his later chagrin and pecuniary loss. This is a case where in one sense he read it but in another sense did not know how to read it at all. There are then limitations to the "reduction of uncertainty" talk about reading. There can be some very useful information theory models for elements of various reading processes, especially for individual letter identification processes among beginning readers. But in order to make the concept applicable to the performances of the skilled reader the notion of a "discriminable feature" has to be generalized. Presently, we have no theory about how the discriminable features of the letters are related to the "higher cognitive" features or units in terms of which the skilled reader processes the text. And yet, that is a crucial element of the information-theory model . Moreover, it is simply not true that wherever there is a difference in the meaning of a pair of inscriptions there is at least one discriminable letter feature. If Knute is a farmer as well as a football player, the pair of identical inscriptions, in different contexts, "Knute plowed through the whole field" can have quite different meanings. And it will do no good to say that the relevant unit of text here is longer than one sentence because we can surround the context for as long as we like with compatible expressions which are spelled differently and do not account for the difference in meaning in the two inscriptions and can furthermore introduce letter differences in the text environment which do not correspond to a difference in the meaning of the expressions. The cost of the information theory discription of reading is the introduction of the undefined and experimentally inaccessible entity called a "feature" which in different reading processes is of entirely different kinds. The matter is further complicated by the analogy, at word level, between "features" and what Fodor and Katz have called "semantic markers". The result is that at this level one hypothetical entity is explained in terms of another which is even more suspect since its inventors do not pretend even to be able to give a list of such markers or a criterion for membership in such a list and, in any case, would never hold that such members are perceptually discernible elements of a text.

It is not that an information-theory conceptualization of reading is not useful. But, once we see we are being driven to construct an elaborate theory of different categories of discriminable features which will have to be interrelated, we are led to wonder whether there is another general discription of various reading processes which does not require such an elaborate abstract theory. If we can get along without having to develop a theory of interrelated discriminable features in order to account for the fact that different readers read in different units, and if we can avoid having to count uncertainty reduction to zero on the basis of erroneous and idiosyncratic interpretation as "reading" then we can improve upon the information theory model.

The chief defect of the information theory model of reading is that reading does not proceed by an elimination of possibilities for inappropriate responses, anymore than does perception of physical objects or our understanding of spoken language. However weak the justification of inductive reasoning which philosophers have been able to devise, it is still true that perception of all sorts and linguistic perception both through light and sound stimuli, is a matter of "jumping to conclusions". That's part of what

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entailed by the view that perception is a constructive process. In linguistic perception, the redundancy within the signal and the stock of general knowledge the perceiver has of the subject and the particular signal serves to guide the programming of cognitive units used to process the sensory array and provide rule-like guidance for the perceptual judgments. But still the judgments, far from being arrived at through the elimination of possibilities, are arrived at by selection on the basis of cognitively guided discriminations in the sensory signal. The background of information guides the deployment of cognitive units which result in discrininations; but the discriminations are only the evidential basis for the judgments, they do not necessitate the judgments. The information theory model is in this respect inferior to an inductive model.

(b) To Recognize and to Identify are Not Univocal (Nor are they synonymous.) First, "to identify" has various uses in contexts where we are talking about word-identification. Nevertheless, there is one thing in common in all its uses, that "to identify" is always to identify as ..... Thus word-identification tasks require that words be identified as sounds (which are uttered to make the identification) or as meanings (where the word is used in a sentence or a similar word is given) or as contrastive in meaning or use (as when its opposite is given, or a contrary or a related word is offered).

What counts as a case of "S recognizes w (a particular word) varies with the context and sometimes consists in a sounding, a writing task or the like. There is, therefore, no single set of truth conditions for the expression because the truth conditions are varied with the context and are imposed, as with "reading", by factors external to the perceptual situation.

Word-recognition tasks are usually similar to word-identification tasks and behaviorally the two expressions are often made equivalent. But there are some contexts in which the two expressions are not substitutible for one another; in fact, in some contexts they stand in contrast and are, therefore, not synonymous. For instance, it is quite appropriate to say that a person recognized a certain word but that he did not identify it correctly. This could happen when the reader clearly grasps the meaning but gives the wrong pronunciation; or where he gives the correct pronounciation and offers the wrong meaning or misuses the word. To recognize a word seems to be a less stringently specified activity than to identify it; for wherever a person correctly identifies a word he is said to recognize it but it is not true that whenever a person is said to recognize a word he has correctly identified it.

The phrase "correctly identify" has some warning value. For, "identify" is apparently not a "success" word in these contexts; one can mis-identify while still not failing to identify, although misidentification may be taken as failure in word-recognition. This is quite different from the usual contrast of these concepts. In ordinary contexts, one can recognize a certain person and in attempting to identify him to a third person, mis-identify him; that does not mean that one has failed to recognize him but only that one mis-identified him. Thus, "to recognize" is a "success" word. While it is true that "to recognize" has comparative uses, "to recognize x as y", just as "to identify" has, the expression "to recognize" is more commonly used non-comparatively; you can recognize x, regardless of whether you recognize x as any particular thing, though you cannot identify x except as a particular thing or sort of thing. It is a reversal of the usual logical order of the concepts to say, in word-recognition contexts, that if you mis-identify

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a word you failed to recognize it; for usually, you can recognize someone and still misidentify him. It is therefore, misleading in empirical contexts to describe the same tasks as word-recognition and word-identification tasks, as if the two were the same because that may lead to false interpretation of what failure consists in. Failure to recognize and failure to identify are not the same thing.

Sometimes to recognize a particular word is to know how to say it; sometimes it is to know how to pick its opposite out of a list; sometimes it is to pick its synonyms or close substitutes and sometimes it is simply to use the word correctly. It is therefore ambiguous to ask whether, when I read a passage successfully, I recognize the words in the passage. I do not have to identify them in order to read the passage(unless this is an odd situation where reading output is the same as word identification). I do not have to sound them, write them, spell them or otherwise manifest recognition through some kind of identification.

Do I have to recognize them in the sense that the resultant sense which I take the passage to have is at least in part determinate in some way because of the particular words? Yes; but what if the passage is redundant semantically? Then it would be possible for the passage to have the same sense that I take it to have when those words are absent. The conglomerate sense of the passage is partially determined by the words even if the passage is redundant because in that case the word in question has a surrogate which is semantically equivalent in the context and each may be said to have contributed to the resultant sense.

But what of the situation where the passage is semantically redundant but I do not recognize the word which is equivalent to some other word but assign the passage the same meaning I would have assigned it had I recognized the word in point? Clearly, in this case, I did not recognize the word as such though I recognized a semantically equivalent word. We can offer as a sufficient condition for word recognition, but not a necessary condition, that a word is recognized in so far as the resultant meaning (the meaning the reader assigned to the semantic complex of which the word is a component) is determined by its meaning in the same way that the intralinguistic meanings of the words stand objectively in the written language. And semantically equivalent expressions are recognized subsequently to a given expression just in so far as the resultant meaning is not further determined by their presence (except in so far as they may eliminate ambiguous readings of the preceeding expressions). Thus in a focal sense of "to recognize" a word is recognized in so far as its meaning determines the resultant meaning of its semantical complex and does so in accord with the word's objective linguistic meaning. Now for that to happen, the reader does not have to look at the word to say the word to himself or aloud, to spell it, or to find it in a list or otherwise manifest any particular apprehension of it over and beyond its contribution to the resultant meaning. Thus, persons can read words which are not even inscriptionally present.

If we leave certain words out, as when someone is typing a draft which a secretary transcribes, the sense may be so obvious that the missing words are supplied and the typist cannot say, without looking, whether they were present in the rough draft at all. This kind of projection is a commonplace of perceptual experiments and should occasion no wonder when it appears in reading. Just as reader's errors follow a certain pattern of semantical and

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syntactical appropriateness (Kolers) so the reader's constructions do also. That means that word recognition of this sort can be present when an individual will fail other "recognition" tests, such as tests on saying or writing or selecting the word from a list, etc. And it means that a person may be able to complete the more circumscribed word recognition test when he has not, in this sense, recognized the word at all.

With a speed reader it may be difficult to tell just how many of the words he has recognized because there is so much material on which to test that we may not be able to make our mesh fine enough to determine for each word whether the reader's resultant meaning is in any way made determinate in the way that this word makes the objective text determinate. But that is only a limitation on the economy of testing. He may even be said to have recognized words which did not fall within the fixation of his eyes.

Therefore, we have contrariety of truth-conditions for "S recognized w", as we did with "S read x", because in some cases S has to manifest his recognition in certain particular ways which operationally fix the meaning of "to recognize" in that context, whereas in other circumstances no such limitation applies and no such behavior is demanded. This is not unlike what we would say of word recognition in talking about oral exchanges. A person may recognize the words without actively being able to repeat more than the gist or general meaning. One can recognize the words without being able to spell, write, recall, pick from a list or otherwise manifest recognition as identification beyond a general indication of the resultant meaning of the whole complex. This not only indicates that we listen for ideas, thoughts, beliefs, etc., but also that word recognition in speech is similar to word recognition in reading. (And writing as well).

(c) Focal senses. There is a group of focal meanings of "to recognize", just as there is of "to read". And the focal meanings of "to recognize" where we are speaking of word recognition, concern the apprehension of a resultant meaning, determined in part by the meaning of the particular word in a given semantic complex. Specifically, if there is a differential determination of the resultant meaning (the meaning as apprehended by the reader or listener) through a particular word presented in the visual or auditory array and that determination accords with the objective linguistic meaning of the word, then that word is said to have been recognized. One can recognize a word in that sense while failing to recognize it in one of the other senses. And, just as we found focal senses of "to read" around which others cluster either as terms designating primitive forms or approximations of the achievement or manifestations of the achievement, so also we find a focal sense of "to recognize ."

A contrast between recognizing a word and not recognizing it, when we use "to recognize" in the focal sense which applies to both reading and listening, lies in the fact that not-recognizing is the activity which is specifically behaviorally manifested, rather than recognition. When a person does not recognize a word, he asks a question, looks puzzled, repeats it questioningly or manifests failure of apprehension through some form of mis-apprehension. With the focal senses of "to recognize", recognition is the normal thing, the thing which is not differentially behaviorally manifested because it is such a frequently present phenomenon that there is no suitable manifestation

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item by item; we hear too many words in listening to the morning news to behave in such a way that we manifest our recognition of each word; rather, it is failure of recognition which we more frequently manifest.

This is just the opposite of the usual situation with the peripheral senses of "to recognize". For when the student is being asked to indicate his recognition by selecting words from a list or marking synonyms or in other tasks, it is specific word-recognition that is being manifested and this is being done through word-identification tasks, tasks which require that the word be identified as such and such. Failure to manifest recognition in such a task is not, by itself, a sufficient indication of failure of recognition, though pragmatically this is the way the output is interpreted. I mention this to indicate that not only are the focal and peripheral senses and the corresponding truth conditions for word-recognition different, they are in fact quite the contrary of one another. And we have naturally to ask why word-recognition which goes on whenever we listen to another and engage in sucessful oral exchanges of information opinion or sentiment, does not also go on with the activity of reading and in the same way, with only a difference in the sensory medium within which the language is presented for our perception? The answer is that word-recognition does go on in just the same way in reading as in hearing. Have we then, erred in devising instructional techniques, by not adapting the already intact ability directly to visual stimuli, instead, taking the student through a complex and perhaps unconnected series of word-recognition exercises which may have no logical connection to the ability we want him to display. Perhaps, but how can adaptation of a skill from one sensory medium to another be brought about directly?

We need not devote to "word-recognition" the same wealth of illustration that we did to "to read" because it is already clear that the term is not univocal; that to recognize a word and to identify it are not (logically) the same thing, though identification is a good way of proving that one recognizes the word; and that there are focal senses of "to recognize" which are quite different, in truth conditions, conditions of applicability and in idea conveyed from the peripheral senses which are used when we speak of certain associated tasks and activities, privileged by the educational system and supposed to assist in achieving its objectives. Our conclusions concerning word recognition parallel the earlier conclusions concerning reading in general.

So we may now turn to and apply these observations to the question: "Do you read the words when you read sentences?" That has a companion question: "Do you read the letters when you read words?" If the context of discussion that concerns us is a "reading with understanding" one, then the sense of "read" in the second question, as it applies to letters cannot be the sense of "read" which applies to words; that is, letters cannot be read in at least one sense in which words can be read (with meaning). If one means by "reading letters" anything like saying them to oneself, thinking of their names, etc., then obviously one can read words without reading letters. But if one will count any behavior which is a differential response corresponding to objective letter combination differences in the text, then whenever you read words, you read the letters. The latter is too broad a description of what reading letters might consist in and would allow that a person hearing a speech (not presented with a text) might still be "reading" the letters because his response is differentially correlated with the contrasts within the letter pattern of the text. Nor will the simple addition of a provision that there must be a visual stimulus of inscriptions be sufficient because it will obscure the fact that we want not only a correlation between letter-inscription

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contrasts and differential responses but also a causal dependence of the differential response upon detectable differences in the stimulus pattern. In this sense of "to read", whenever you read words, you read letters. Do you read all the letters? You read all and only the letters which belong to groups of letters which correlate with and causally account for the differential linguistic responses to the visual stimuli; in some messages that may mean that you read all the letters; in other messages, you may read very few, depending, not upon information content of the message, but upon whether the letters are members of meaning differentiatial groups of letters. So you may in reading a message read some letters which someone else, deriving the same resultant meaning, has not read.

A parallel answer applies to the question concerning whether we read words when we read a text. For example, suppose I am reading a letter which has arrived from a friend and which runs several pages of single-spaced typescript. Among the things that I perceive in reading it are that he is having a good vacation, that he has begun work on some new papers and that his automobile has been giving him trouble. (I can see that these things are so, of course, only on the already present and justified belief that he will write me about things as they are and not mendaciously). In the process of finding out these things, I have read well through the letter. Have I read the words of the letter? All the words?

The answer seems to be this: if the resultant meaning I have grasped from the text has been made determinate with respect to the linguistic meaning of some word which is in the text and which has that same determination-role in the text, then I have read that word, provided that the overall process of forming a resultant meaning is dependent causally upon my processing the visual array of inscriptions toward some reading output (e.g. finding out what the writer says).

We made clear enough earlier that what counts as reading a word in one pragmatic context is not the same as what may count in another. Now we want to make clear that with respect to different reading outputs (e.g. finding out what someone's adventures have been, as contrasted with finding out while his is an alliterative and periodic style) different things will count as reading the words. In relating to the more elaborate reading outputs, it is sometimes correct to say that a person has read words which have not even fallen within the group of sensory stimuli which excite his vision.

Applying what we said above concerning letter reading, in one broad sense where we count as letter reading every differential linguistic response of the perceiver which is correlated with letter combination differences and is causally dependent upon the reader's discriminating letter combination contrasts (but not necessarily these particular ones), then whenever one reads words, one reads letters. We are not as likely to talk this way about letters as we are about words. But look at the parallels in oral language: we are willing to say that a person who hears what another says, hears the words he uses and hears the vowels and consonants, the letter sounds of the words he uses. That of course does not entail that the hearer can tell you the vo ls and consonants used or correctly correlate sounds and letters; nor does it mean that he can himself break up the word into component sounds for you or that he can even list the words used in the utterance that he heard. Rather, in ordinary language we have senses of "to hear" and "to read" which allow us to say that the components are read or heard whenever the complex is read or heard; and we also have senses of the very same terms which allow us to deny that when the complex is read or heard, the components and components of components must be read or heard. What

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is surprising is not that we have uses for the terms which allow the denial, but rather that we have uses which allow both the affirmation and the denial depending on the circumstances.

That calls attention to another parallel with visual perception of objects and things. We have senses of "to see" which allow us both, depending upon the circumstances, to affirm and to deny that when a complex is seen, its components are also seen. And we have an even more fundamental and general term, "to perceive", which allows us to go further and say that when a complex is perceived, a component which is not itself perceivable is also perceived: if I perceive an orange on a table, visually, I must in some sense perceive its inside because I do not perceive an empty perfect orange-skin but a whole fruit. Thus "to perceive" allows some contrasts that are not allowed by the various senses of "to see" and "to hear". It is not some anomalous use of "to read" or "to hear" in which one who reads or hears a message is said also to have read or heard the words which compose it; and it is only a short step from there to holding that it is true that one has read the letters or heard the sounds which compose the words.

If S has read (in a focal sense of "read") the message, there must be a resultant meaning for S; he must take the message to be such and such. If the reading process is successful, then the resultant meaning must be in some kind of correlation to the linguistic meaning of the expression on the page; but the linguistic meaning on the page is there only through the combinatorial properties of the inscription pattern on the page; hence, the resultant meaning will be determinate in ways which correspond with the combinatorial relations of the elements on the page. So why not say that the words have been read? In this context this does not mean that they have been sounded or that they have been noticed or anything beyond a "coming into account" linguistically in the determination of resultant meaning for the reader. That can happen without his eye's even falling on the word, just as in visual perception you can perceive a person all of whose body surface is out of sight. You can see him, for instance, by recognizing some part of him or some gesture. Some writers call perception "constructive". If this is so, then reading is a constructive process; indeed, all perception is a constructive process and therefore the difference between the really skilled and the initiate in reading is not that one samples or scans and the other does not, or that the one constructs and the other does not, but rather in the units by which the momentary stimulus is processed and in the way in which previous states of processing determine subsequent sensory stimulation through brain-direction both of the sensory organ and of the state of attention. While it is true that only some of the letter contrasts in the message actually provide contrastive visual stimuli for the accomplished reader whose eye flits over the page with gaps where there is no inclusion of the letters at all, we may still want to say that those letters were read because of the general correspondence of resultant meanings to letter-group contrasts and because the development of the resultant meaning is dependent causally upon the visual stimulation provided by some of the letters; for a skilled reader, not going back to look is frequently equivalent to looking!

Here we are neither legislating how words should be used nor proposing changes in their senses but rather excogitating a rationale for the use which is actual. When we say that the reader has read the words and the letters but would be unwilling to assert in any of the particular senses of "to read" that he read them in that way, though he might have, we are simply calling attention to uses of "to read" permitted in ordinary discourse and to the absence of entailments among the various senses of "to read" and providing a way of explaining what is meant by the true claim that a person can read a book and even read every word in it with only three or four glances every two pages.

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In this focal sense of "to read", where there is reading insofar as there is a resultant meaning which is determined by the linguistic meaning inherent in the text, a word is read or recognized in so far as its objective linguistic meaning differentially determines the resultant meaning apprehended by the reader.

This analysis is confirmed by the Kolers experiment (Ch.1,n 11)which indicates that among bilinguals, the inability to recall which language was used for a certain idea indicates that the primary unit of processing for skilled readers is ideas and that such reading does not go on "word by word". All this is further confirmed by the fact that the meanings of individual words are semantically affected by the meanings of words in the environment and that therefore, words cannot in a certain sense be "identified" apart from the identification of words in the environment.

Putting the point about reading a text and reading the component words more generally we can say:

If S is reading for meaning and w is a word which is an element of the sentential complex (c) visually presented to S and the resultant meaning for S is determinate with respect to the linguistic meaning w has in C and the resultant meaning for S is a causal derivative of S's processing the visual array (and not of S's prior knowledge of the sentential whole), then S reads w, regardless of whether any letter of w retinally stimulates S or whether being retinally stimulated by w or a part ofw,w is separately identified. Hence one can read all sorts of words, symbols, notes, etc., which are not specifically visually processed.

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Chapter 3: Can "Reading" be Reductively Analysed?

A. The Reductive Categories.

Having displayed, through exhibition analyses, the variety of senses and truth conditions which concern "to read" and "to recognize" (words), and having tried to put the discussion of reading into broader perspectives concerning perception in general and its similarities to hearing, and having vigorously insisted upon the intrinsic linguistic meaning of written text, we may now ask whether there is any general conceptual scheme within which we may make some order from this variety of concepts while answering some of the theoretical questions which are still puzzling us and providing a frame-work for the incorporation of the vast amount of empirical information (concerning abilities and deficiencies) which is already available.

As the discussion of methods and procedures in Chapter 1 indicated, we are engaged in a paradigm search, looking for an interrelated set of concepts by which we can describe the various kinds of reading processes, activities, abilities, and defects and can formulate the various sorts of empirical research problems for which we need answers in order to achieve certain pragmatic pedagogical objectives.

One means we have proposed to adopt in this search is the process of logical reduction or logical construction (1) to provide analyses in terms of a smaller group of concepts in order to reduce conceptual complexity and to reduce our commitments to various sorts of realities; (2) to spell out truth conditions so that we have a clear idea of what is being claimed and (3) to justify the particular choice of concepts by extrinsic and pragmatic considerations.

Such extrinsic and pragmatic considerations are: Does this conception unify present knowledge and apparently organize future inquiry? In particular, concerning reading, does this conception accord with what is already known about the physiology and psychology of reading, and does it better locate, logically, the investigations into reading defects and deficiencies and the studies of developmental psychologists and psycholinguists? And, will this conception allow an intelligible and fruitful formulation of the unsolved problems concerning reading?

In developing the general conceptual scheme which follows, we are also preparing for the argument, on logical grounds in the next section, that (a) there is no such thing as a specific reading process; (b) the ability to read is the adaptation to a visual input of inherently meaningful inscriptions, of general linguistic abilities which are in principle independent of the sensory medium of the language, provided the medium is capable of preserving the inherent linguistic meaning of the units of language. One is not to take too seriously the apparent conflict in our here insisting that an ability to read is"an adaptation.....to inherently meaningful inscriptions...", after we we have already remarked that there can be reading of lists of meaingless inscriptions; we are here speaking of one focal sense of "to read", one that is highly esteemed but not exclusively privileged by our educational and social system. Suitable modifications or sub-senses of "to be able to read" can be devised for each of these other kinds of reading.

The basic categories of analysis we use in this and the following section are the concepts of: ability, the exercise of a certain ability, an activity which is the exercise of an ability, visual input of inscriptions, linguistic and reading outputs, output manifestations, adaptation and bias.

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Some of these terms, like "input" and "output" have a suitably modern ring to them; but "ability", "exercise", "activity" and the like seem to be concepts of suspicious antiquity. Antiquity they have; but also a certain usefulness which has not been much appreciated in recent times. For they are more precise than would appear at first and will allow for various sorts of empirical description and modeling. Thus the ability to fly an airplane can be demonstrated in a number of situations which are simulations of flying conditions. And we do not hesitate to talk of the ability to speak English or French; the ability to read and write, the ability to drive a car and so forth. There is every advantage, therefore, to working with a family of interrelated concepts which already has general utility in ordinary language; for what we say about reading will have to conform to what we can say about human activities and abilities in general.

By "ability to do x" here we mean "active capacity with respect to a certain kind of activity, x, and a disposition for its exercize". Thus the ability to walk is an active capacity for the activity of walking and a disposition, conditional to be sure, to the activity. Thus there are as many senses in which a person may be said to be able to read as there are senses in which a person may be said actually to read.

It is reading ability which is the objective of education in reading; the active capacity, along with a disposition to its exercixe, to process text visually to a "reading output" -- that is what we want to create in the population in general. But reading ability is not directly accessible for examination; it is, accessible only through its exercise, only through the activities which constitute reading. And those activities can be largely or wholly internal to the reader and are not necessarily available to observation or even to introspection. The activity, which is the exercise of some reading ability, must be examined through some process which yields an output. Reading, no matter what kind of reading, is a transitive activity. It has a product, whether it be a letter sound, a word sound, a sentence meaning, a belief or other epistemic attitude or affective state. "Reading" is a success or achievement term; if you read something, then there is some output.

But even the outputs may be internal to the reader. He may understand, he may believe or disbelieve what he has read, but like a listener, he does not have to show externally what the output of his activity has been. As a result, we have to look for an output-manifestation. That expression is just a name for something good teachers have always recognized and insisted upon for their students: observable feedback to the teacher or observer which indicates the output of the reading process and manifests the occurrence of the reading activity in question. While it is possible that someone may be quite able to read for meaning and quite unable to manifest his comprehension, the situation is rare enough to be classified as a defect of output-manifestation, perhaps a motor or speech defect, etc., and can certainly be differentially diagnosed from the condition in which the person lacks the reading ability. We shall therefore, not pause here over defects in output manifestation.

There is no direct access to reading abilities; there is no direct access to reading activities; there is not even a direct access to the output of reading activities. But there is access to output-manifestations, since as the very name indicates, they are observable.

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We begin by distinguishing out-put manifestations of various reading activities as they are usually distinguished by teachers and manual writers; we then observe that there is not one sort of activity which corresponds to each of these manifestations because we can see that the same product can be the result of various sorts of activities. But we soon find that we can group the activities into classes, classes corresponding to groups of linguistic abilities which we can distinguish in oral speech as well. And while we find that a certain output manifestation may be the result of activities of quite different classes, the borderline between the classes of activities remains well-demarcated by the ancient principles that (1) you may be able to do the one thing and not the other; (2) the output of the one does not entail the occurrence of the other; (3) being able to do the one thing is not sufficient for being able to do the other; and (4) being able to do the second is not necessary for being able to do the first.

Output manifestations: Thus imagine that we have set up an output manifestation situation for word recognition which consists of two steps, saying the word aloud, and then using it in a sentence. These activities are to manifest the output of a reading activity, recognizing the words in a passage, the immediate output of which may be purely internal to the reader. There are various activities which the reader may carry out in order to get to the stage of manifesting the output as we have requested. He may sound out the word on the basis of phonic correspondences; he may grasp the meaning by extrapolation from the context and get the sound by recall of the spoken equivalent. These are quite different reading activities which lead to the same reading output manifestation.

However different the activities of individual readers, the process is counted as a word recognition process in terms of the kind of output manifestation which is required for successful accomplishment of the recognition task. Thus in test situations, the usual recognition task is combined with an identification task since the subject must manifest his recognition of the individual word through some selection or identification process, like selecting a synonymn from a list.

In the middle right hand and left far right hand quarters of the Table I (at the end of this chapter) we have listed some of the differential manifestations of various reading processes. Thus, it is fairly common for letter identifications to be manifested in individual sound assignments or assignments to groups, in labeling vowels as long or short, in labeling groups of consonants as blends or digraps. It is common for sound identifications to be manifested orally through group blending and sounding or through individual letter sounding, depending upon what the classroom program demands at the moment. In advanced readers there is usually no direct manifestation of letter recognition, but there is, of course, indirect manifestation in the more elaborate responses which require letter recognition of the sorts we discussed in Chapter 2.

Word recognition outputs do not stem from the same activities as the word recognition which we discussed at the end of the preceeding chapter, though there are various kinds of output tests that may be used to determine whether that sort of recognition has occurred, too. Rather, we are thinking here, in Table I, of the kind of word-recognition which is demanded of beginning readers, when we can determine whether a particular word is recognized by asking for its sounding, its meaning, its use in a sentence, the use of a word with the same meaning, or by examining the error patterns of the child to find out whether he recognizes the word but incorrectly identifies it, or by demanding certain sounding outputs.

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The idea of what we mean by an output manifestation must be fairly clear now: it is a behavioral indication which is considered necessary and sufficient for the occurrence of the reading process which is being tested. We are not here concerned with the theoretical reasons for saying that the output is neither necessary or sufficient. In pragmatic circumstances of reading education failure to meet the output task requirements is counted as non-occurrence of the required process and success in meeting the task requirements is counted as occurrence of the process. The breakdown of the processes into six general classes is thus based upon the various groups of reading output tasks which are frequently imposed upon students. These output classes furnish a rough indication of the classes of processes and therefore, the classes of activities which go on in reading.

We are certainly not claiming that the output classes may not be divided in other ways or that there are not subdivisions within various categories which may for one purpose or another be found more useful than the broad classes we have used here. We claim only that these output manifestations are distinguishable and help us locate the activities and abilities.

Activity Classes: The classes of activities are named in terms of what the output manifestations are supposed to indicate. Thus, we speak of letter identification activities, word identification, sound identification, phrase identification, linguistic search and semantic organization. There is no particular reason why the latter two could not be broken down into various sub-activities. For instance, it is one kind of semantic organization to determine the story line of a short story; it is quite another kind of semantic organization to determine the character development sequences for several characters in a short story. And it is one thing to anticipate the development of the plot of a detective story and another to anticipate the occurrence of certain words in a sentence.

But basically, the things mentioned are still linguistic search activities and semantic organization activities, and each of the more specific forms of those activities can be tested on material which is quite independent of reading.

Each one of the activities, letter identification, word identification, sound identification, phrase identification, linguistic search and semantic organization, is a modality of perception. The letter identification activities may in some cases be cases of perceptual discrimination, whereas each of the others is usually a case of linguistic perception, perception through cognitive units related to linguistic structure or linguistic meaning.

It is not theoretically important, as far as I know now, to fix the borderline between activities in such a way that we are never in doubt as to whether we are dealing with a case of word identification or phrase identification, for instance. Since the borderlines among the output manifestations are not so clearly fixed, we see no reason to expect precision about the distinctions between the activities. Moreover, the activities involved in word identification may be quite different on different occasions, as the chart attempts to indicate. For instance, the word may be identified in a sound as a result of a combination of linguistic search and semantic organization; or it may be identified as a result of a letter by letter sounding with subsequent blending. Those activities are quite different.

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Abilities: When we encounter the fact that the same output manifestation may result from quite diverse sets of activities (what we call in the next section, different complex reading processes), we realize that the activities are not what we are most interested in theoretically, it is the abilities which give rise to the activities. On the left hand side of Table I is a listing of the six categories of abilities which correspond to the six categories of output manifestations and the various lines indicate possible arrangements of the activities which are the exercise of those abilities in producing various manifestations.

Each of the abilities other than letter identification is a general linguistic ability, manifested in the processing of oral language and "letter identification" is not, as the next section argues, a specific reading ability either. It is a general perceptual ability which can be tested on material which has nothing to do with reading.

We can therefore, prove the existence and test the development of these abilities, in most persons, by providing analogous output manifestation tasks based upon oral speech. And we can find that one or another of the abilities can be impaired in various ways without entailing a comparable impairment in the others. That is how we prove that these are distinct classes of abilities. An additional proof is to be found in our setting up tests which show that the exercise of one ability inhibits or blocks the simultaneous exercise of another. That is one of the conclusions we can draw about letter-figure identification and word identification from the example Smith offers.[1]

In skilled reading, we hypothesize that each of these general linguistic abilities becomes adapted to a visual input of inherently meaningful inscriptions, so that each becomes a perceptual ability; specifically, a linguistic perceptual ability adapted to a visual input. We should be able, therefore, to test individual students for the development, in a reading context, of each of these classes of abilities. And wherever the student seems below par, we should be able to test the same skill in its oral language context. If the student does not exhibit a defect in the oral language context, we should be able to determine whether the processing of the perceptual field is within tolerable limits, through various perception-diagnostic tests, such as the Frostig tests. Where that does not account for the defect, we can then investigate the output manifestations to see whether there is a motor defect, a sensory defect, a lack of motivation or the like, and finally, we can consider the possibility that there is a defect of adaptation or cognitive development. The screening of cognitive development is also easy enough, given the various manifestations through task performances which are taken as reliable indicators. What is not at all easy to do is to determine whether adaptation has not occurred properly. But, as was remarked in the preceeding chapter, this is a subject which needs a separate investigation.

Underlying the classification of concepts here into those concerning output manifestations, outputs, activities, and abilities is the following hypothesis: that a reading process is the exercise of one or more reading abilities to produce a reading output. Reading processes take time; they can, if complex, consist of various sequences of reading activities arranged so that they are input-dependent and can also consist of various sorts of parallel processing through independent reading activities. Thus we are led to ask how the various reading activities might be arranged to yield various sorts of reading outputs. Specific hypotheses concerning this are indicated in Table I where

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the various input dependencies are indicated. What we find is that a small number of classes of abilities through different sequences of exercise, can result in a vast number of different reading processes and the output manifestations of those reading processes, despite the differences in the sequences of activities from which they result, display a correspondingly small number of classes of behavioral manifestations. Thus we have a limited number of manifestations which can be arrived at through the exercise of a limited number of abilities whose activities can be arranged in an enormous variety of ways.

Having indicated the general concepts "manifestation", "output", "activity", "process", and "ability"; in terms of which the paradigm of a reading ability (in the focal sense of "to read") may be formulated as "the adaptation of nonspecific language abilities to a visual input of inherently meaningful inscriptions", we may now turn to the arguments by which this conceptual reduction may be defended and further explained.

B. Logical Reduction

(a) Fundamental Reading Activity? First we ask is there a fundamental reading activity? Fundamental reading is correctly called a reading activity in at least some cases and must actually occur in any context in which a reading activity occurs. Is there some activity properly called reading which we carry on whenever we are doing anything which is properly called "reading" and which we can, in some cases, carry on without carrying on any other activity which is properly called "reading"?

If there were a fundamental reading process there would be some reading process in need of analysis which is neither "extracting-meaning-from-inscriptions" nor "translating-inscriptions-into-some-other-form-of-language-to-which-meaning-is-already-attached" since neither of these activities is carried on in every case of reading. The same holds for the activities belonging to the other classes which I have distinguished; (6) semantic organization, (5) linguistic search, (4) phrase identification, (3) word identification, (2) sound identification, and (1) letter identification. A person can read lists of words without semantically organizing them; and a person can semantically organize a list of words he has not read; a person can read lists of words without linguistic search with outputs expressed in anticipations of the various sorts to be mentioned later; a person can read words without reading phrases; a person can read letters without reading words; one can read letters without making sound assignments and one can do any of the other things mentioned above without reading letters.[2] Therefore since a person can be reading without carrying on any particular activity of those categories, none of the activities which fall within my six categories is a fundamental reading activity. But perhaps, "processing a visual array of perceived inscriptions to some reading output" is present in every case of reading. And indeed it is. But that is no more than a general description, already including a vague concept of reading, which can be satisfied by any reading process whatever, and which is satisfied by every case of reading even if there is not some fundamental reading process. That description is satisfied disjunctively by all reading processes. There is in every case of reading some reading process because reading processes have reading outputs. Yet this description is not something one can satisfy without carrying out some other activity properly called reading, either letter reading,

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word reading, phoneme reading, semantic organization or linguistic search. This cannot, then be a fundamental reading process.

There is no one reading activity (specified by its yielding a particular reading output) which is present in every reading activity; that's why we have not found a "fundamental" reading activity. There is no one reading ability which is utilized to produce in whole or in part every reading outcome.

For instance, suppose it were agreed that to be reading one must be visually processing symbols which are inherently meaningful and which belong to an inscription system. Then one could not read letters and one could not read nonsense words. The symbols do not have to be inherently meaningful; in fact the inscriptions do not have to be symbols because one can read expressions in an artificial language which is readable because of its relatedness to natural language but is inherently meaningless. To modify the criterion to say that to be reading one must be visually perceiving symbols which belong to an inherently meaningful system of inscriptions will only relocate the problems. Perceiving the symbols is not enough; even a child who cannot read can do that; and one can perceive the symbols of an unknown language to be "symbols" without being able to read them. So no such process is peculiar to every reading process in such a way that it is part of every reading process and not part of any non-reading process.

There is no one reading activity such that if you are not doing this, you are not reading at all.

Complex Reading Processes: Next, we consider reading processes which are composed of diverse reading activities. We shall call a reading process "complex" when it involves input-ordered reading activities of distinct categories (as listed in Table I[3]) and we shall try to explain something of the ordering within such complex processes.[4]

With respect to a given reading-output-manifestation, such as achieving a perfect score on an SRA quiz on a passage, there may be more than one reading process involved in achieving the overall output. We want to talk of the overall reading process of achieving the perfect score, a process which takes time and, therefore, may have component intervals and may have various component processes, variously ordered during the interval of the complex process. So let us define the expression "first level reading process with respect to a given output, O." Thus, R will be a first level reading process within a complex reading process, RP, which leads to O, iff:[5] R is carried out in achieving O, and the outcome of R, O', is identical with O, or O' is incorporated as input into some reading process (or input-ordered series of reading processes) whose final output is O; and there is no other reading process R' which is carried out in achieving O whose output is utilized as whole or partial input for R in the achievement of O'.

Basically the idea is that within a complex reading process (with a given output under given circumstances) a certain process is "first level" if it is a component process whose output (e.g. letter sounding) is used to achieve the overall putput (e.g. word sounding) and which does not itself use the output of some other reading process (e.g. letter naming) to achieve its own output. In every complex reading process, there must be at least two reading processes R and R' where one uses the output of the other as whole or partial input. The only ways that two reading processes can be ordered are that one uses the output of the other as input[6] (whole or partial, depending upon circumstances); or the outputs of both become whole or partial inputs for some other process or

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processes. Within a complex reading process, which must occupy an interval of time, there may be two or more reading processes which are "first-level" though that will require that there is still at least a third reading process which is not.

In any given reading process must there be at least one first level reading process? Since a first level reading process within a complex process and in relation to a given reading output is "a reading process whose input is not the output of a reading process and whose output is whole or partial input to some reading process", if there were no first level reading process it would either be because (a) no reading process had its output used as input for a reading process -- but that is ruled out by the hypothesis that the process is complex (rather than, say compound, where there may be parallel processing through different classes of activities but no subordination of outputs[7]); or (b) no reading process has an input which is not the output from some reading process. But under condition (b) the complex process would be circular or composed of an infinite number of reading processes. In both these cases there could be no account of how we got a reading output from a visual input. Yet that is what is to be explained. Therefore every reading process contains at least one first level reading process. But I note that the "first level" process need not be first level throughout the reading process interval and the "first level" function may be shared among several processes during different sub-internals of the overall process. Where the output is, say, understanding the career of Pip in Dickens' Great Expectations, it is quite possible that processes from each category which can have members which are first level processes will occur as first level processes within the overall reading process. Sometimes we might read words, by direct recognition, without letter naming but with letter identification through sound correlations; sometimes we might name individual letters to identify a word we had to look up in a dictionary and so forth. These activities can all be first level activities within some complex reading process of the sort indicated by the example and may function over time as both first level and as derived processes.[8]

The pictorial analogy I have in mind here is that a complex reading process can be described as a large circuit diagram (with six main circuits) variously interconnected by output ordering at various moments; and for each temporal sub-interval which is long enough to shift from one input-ordering of the categories of processes to another, there may be another circuit diagram relating the inputs and outputs of the processes; so, the array of these arrangements is like a set of vertical slices each of which reveals a different circuit diagram of the six classes of processes; and outside the diagram is a selection device (like a timer) which moves the processes from one arrangement to another, according to a combination of an acquired bias and a measure of overall output.

(c) Derived Reading Processes. Certain groups of processes may be input-ordered. For instance, the output of 6 may be input to 5; the inputs of 1, 2, and 3, may be at various times independent of the outputs of other reading processes or may at various times be wholly or partly derived. Thus there is a basic circuit pattern of possible input orderings and there is something which at any given time accounts for the actual circuiting of the information; that is the "bias".

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Certain reading processes are always derived because they presuppose the output of some other reading process as material. It might be thought that semantic organization would be the most obvious example of such a process, but it is not. While it appears that for there to be semantic organization, there must be something which is organized, namely, word meanings or words, this is not, strictly speaking, accurate. For in direct word recognition, the recognition of a given word may consist solely in the adjustment of the resultant meaning x in accord with the objective linguistic meaning of that word. As a result, there does not have to be a preceeding word-recognition process. Rather, semantic organization entails word recognition for the material organized, and therefore has word recognition as a logically necessary condition; but this word recognition is not the same sort of word recognition which we find indicated by the word-recognition manifestations at the left of Table I, for they are mostly indirect recognition manifestations and in most cases are the output of word recognition tasks which manifest only peripheral recognition and not the focal sense of "word recognition". Semantic organization does not have to be a derived process.

Linguistic search does not have to be derived, either, at least not from a process lower on the chart; it can have its input derived from semantic organization. But only in that way is it not derived; for linguistic search must be based somewhere; it must begin from an input which is the output of some activity other than linguistic search. (That of course does not exclude the possibility of linguistic searches based upon the outputs of previous linguistic searches). I do not mean here that meaning anticipation or word anticipation must not be in readiness before any words or letters are recognized, but only that for the anticipation to have a specific output, this must be by way of a projection from information already derived from the text. Hence the set of linguistic anticipations must be grounded in particular word recognitions, phrase recognitions or letter recognitions which are the result of other reading processes than linguistic anticipation.

As we distinguished recognition from identification in chapter 2, so we must here. The characteristic output of linguistic searches is anticipations, whether of meanings, words, phrases, or even letters. Those searches may be based upon previous recognitions or upon previous identifications. Identifications do not exist without some output, of the sorts indicated in Table I. But recognitions may be by incorporation into a higher perceptual unit. When the word "dog" is immediately recognized in the semantic organization of "The dogs knocked over the garbage cans", we can also say that the letters of the word are recognized. That does not require that they be identified, though in beginning reading this may be the way the recognition of the word is accomplished. Whenever the search is based upon an identification the process is derived. Whenever the process is based upon a word or phrase recognition or upon a previously organised meaning it is also derived. It seems then that linguistic search can never be a first level reading process within a complex reading process.

Phrase Identification. If there is not an input via word recognition or identification from sound recognition or identification, there is nothing for the phrase recognition activity to be applied to. In the presence of partial input from word sound or letter recognition, there is nothing to prohibit the major source of input for phrase-recognition from becoming the outputs of previous linguistic search and semantical organization activities. In fact, this

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is frequently the case. Phrase identification is always derived. Phrase recognition need not be, since like word recognition it can be incorporated into semantic organization.

(d) Specific Reading Abilities: Could any of the abilities which give rise to derived reading processes be a specific reading ability? Definition: A specific reading ability may be described as linguistic ability exercised only upon visually perceived inscriptions and yielding only reading outputs. The derived reading processes are not specific reading processes because the output manifestations could be the same regardless of whether the sensory stimulus is visual or aural in persons who are able to see, hear, and speak. So, the corresponding abilities are not specific reading abilities. When we try to characterize the activities from which we get the manifestations of semantical anticipation (linguistic search) and the ability which gives rise to those activities, we find that the activity and ability are the same (as well as the outputs) for written and uttered speech; and it looks as if acquiring the reading abilities which belong to the linguistic-search category is simply a matter of adapting abilities already present in our capacity for oral discourse toa different sense modality. That is quite a different matter from having to acquire the ability in the first place, as has been discovered with attempts to teach children deaf from birth to read; for they do not have the basic linguistic skills and are learning language as much as they are learning to read.[9] Moreover, it is not clear whether the adaptation of these general linguistic abilities (4, 5, and 6) is to a new kind of input or to an input which is the same as in oral speech but is derived in a different way. In a sense the input is of a new kind because the sensory modality of the signal is different; thus there are millions of rod-cone signals for a fixation on "The" and far fewer aual nerve signals for the corresponding sound. But the combinatorial properties of the freely variant sound,"The", among sets of sounds of English are comparable to the combinational properties of the freely variant letter combination "The" among visual inscription patterns of English. Since the combinatorial properties or regularities are correlated with meaning, we can conclude that the input -- the bare neural signals--regarded as linguistically related to others are in important respects the same. Thus, in one respectthe visual input is the same as the input in ordinary speech and in another respect the sensory modality, it is difficient.

Assuming that we are dealing with a child who already has the ability to organize words to an overall meaning (semantic organization) and the ability to anticipate words, phrases and ideas (linguistic search) and the ability to recognize phrases and words and even individual sounds in oral discourse, we can ask whether these abilities are adapted to a different input (sight over sound) in order to become reading abilities or whether they are applied to something which is itself a product of visual perception but already made neutral to the sense modality in which it is received. The answer seems to be that both situations occur. When a child is just learning to read, he frequently uses letter recognition processes to form a sound correlate of the written words and then semantically organizes the uttered words; the higher linguistic abilities are applied to the uttered correlate of the written inscription; thus his process does not differ very much from his listening process once he has produced the sound correlate of the letter pattern. This is what is often referred to as the "decoding" process, or as "translating from one form of language to another form to which meaning is already attached". There can be no doubt that this is how the higher linguistic processes are applied to the reading task among beginners. This is not an adaptation of the ability but only an application of it.

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But this is not the only way in which higher linguistic abilities are integrated into the reading process. Through various kinds of cognitive units, the visual array can be directly processed into word recognition, semantic organization and, derivatively, linguistic search outputs. While the former is what one would conjecture to be the more frequent method of application of the higher semantic abilities to the reading task, the latter is the kind of adaptation which is desired within our educational objectives. It is not at all clear that following the route of the first sort of application, pedagogically, facilitates the creating of the second, adaptation. Nor is it clear that if the objective educationally of instruction in reading is to produce functional literacy in ninety percent of all ten year olds, that this will not be more easily achieved by our abandoning the educational objective of creating a real adaptation of linguistic abilities so that there is direct word processing and semantic organization. Perhaps, instead, we should adopt the "sound correlate" approach on the ground that there would then be only one process to teach to persons who already have basic linguistic competence. We cannot settle this matter here because further empirical data concerning the problems of adaptation of abilities directly to a visual input is needed.

Linguistic search abilities, like semantic organization abilities, are general linguistic abilities usually acquired in one's experience with spoken language. Children anticipate words in the sentences of others; they anticipate the forms of replies; they learn the forms in which replies must be given to certain kinds of questions; they can complete another's sentences, supply missing words; supply definitions, synonyms, antonyms, homonyms, rhymes, etc. But the adaptation of linguistic search to reading may be somewhat more elaborate than the adaptation of semantical organization needs to be; for the semantical organization processes frequently work on words already identified (in sounds). Linguistic search, since its outputs are in the form of anticipations, may involve word-form projection or letter projection, expectation of certain syntax indicators, expectation of certain meanings for what comes next, identification of words in the periphery of vision on the basis of anticipated meanings (completion of a vague image by visual-form projection) and a number of other outputs which involve visual imagery[10]. Yet, despite differences in the sensory mode of outputs, linguistic search abilities are clearly general linguistic abilities.

Phrase identification, to be distinguished from phrase recognition, can be of two sorts: identification of phrases as a whole and identification of phrases by processing the recognized or identified words which make up the phrase. In the first case, phrase identification can be the result of projection (through linguistic search) of a whole phrase (which can be confirmed or disconfirmed by a word or letter sampling); phrase identification word by word, can be the result of semantical organization of word recognition outputs or by the application of super-segmental phonemes to vocally or sub-vocally expressed word groups. This can't be a specific reading ability because the same output manifestations can be generated in oral discourse. In fact, the very same steps may be followed to identify some doubtful expression.

Word identification does not logically presuppose either sound identification or a letter identification to provide the reader with an input for word reading. One can read directly for meaning without sounding the words or spelling them, since the inscriptions have inherent linguistic and, where appropriate, sense meaning, just as do the spoken words. Moreover, word-recognition does not require word identification. Identification is in skilled reading a relatively rarely used process. Although representing a text to oneself as at least

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partially spoken (by interpreting the text with a sound-grapheme algorhythm) may provide ready access to the linguistic meaning of the text, it is not the only way to gain access to the semantical content of the text. Word reading can, therefore, be either a simple or complex process (if word identification is the output). And word reading, as an element within a complex process, can be either simple or derived. Its outputs do not have to be "visual" and usually are not. Direct word recognition is a commonplace in oral discourse.

So too, a sound identification activity may be applied directly to a whole inscription or it may be applied by way of a correlation of sounds with parts of the word and subsequent blending, or it may be achieved by projection of the whole sound on the basis of a meaning anticipation and a sound anticipation, e.g. in poetry, or on the basis of prior semantical organization which indicates the way a phrase sound will be organized; there are numerous other ways in which sound identifications can result from the interplay of reading activities belonging to other reading categories than "sound identification". Sound projection (as distant from anticipation) involves more than anticipation of word sounds or letter sounds, it involves the expression of the projection either vocally, subvocally or imaginatively, with stress, intonation, and super-sequential groupings which represent both syntactic and semantic markers: ("They are eating apples" vs. "They are eating apples".)

Thus the inputs to processes of level three can belong to any of the levels above or below which belong to a particular complex process or may be derived directly from the visual array. The same holds for sounding, and for letter reading.

I have been assuming that the modern text is partitioned by the reader on the basis of spaces before and after words which indicate word beginnings and endings and by punctuation into thought units. It does not seem necessary to regard text partitioning as a reading ability for two reasons: (1) a person going over an unpartitioned text to determine spacing and punctuation must read the text in order to partition and punctuate it; and (2) a person who has a partitioned text and looks it over, noting the partitions and punctuation would not be said to be reading the text or even reading the spaces and punctuation. We do not count this as a reading ability. And, whether we choose so to count it or not, it is evidently not a specific reading ability because it does not differ from general conceptual skills used to arrange visual data of other sorts: designs, for instance.

It is fairly clear that semantic organization, linguistic search and word recognition (as given in table 1 of this Chap.) are reading process groups which involve general linguistic abilities, linguistic abilities which can be both manifested in and described in terms of responses which need not be derived from a visually perceived inscriptional input. We have noticed that letter identification, sound identification and word identification can be either the whole reading process we are concerned with in a given case (as identified in terms of some task) or can be parts of some more complex process. When LI,SI or WI is the whole RP, no input to the process is an output of some process in a different category. A process at level N is the simple RP yielding O, iff there is no reading process output of a process level not equal to N which is partial input to the process at level N which yields O.

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Where letter identification or sound identification or word identification is a simple reading process yielding 0, can we explain what occurs as the exercise of a non-specific ability adapted to a visual input? Apparently the most difficult process to explain this way will be simple word recognition, which does not proceed by way of a sound correlation, does not identify a word meaning indirectly and does not involve identification of the word through various forms of projection or linguistic anticipation.

We can ask a parallel question about simple word recognition in aural speech; what does word recognition consist in when I read you a list of words, where the only output on your part is to be a simple "yes" or "no" indicating that you do or do not recognize the word. The sound is not the word.[11] Whether or not one recognizes the word depends upon what criterion of "recognizing" one decides to adopt; if one adopts "having heard it before", that is simply a matter of remembering whether you have heard the word (not just the sound of the word); a parallel criterion for word recognition in reading would consist in whether the person had seen the word before. Determining one's answer on that basis is a word recognition process, but it is not a specific reading process, since the very same process could be applied to photographs, objects, persons, etc., with exactly parallel outcomes. If the word recognition manifestation is taken to be an affirmative answer to the question "can you use this in a correct sentence?" (about which the person could of course be wrong), then it appears again as if the "reading activity" is an adaptation of a general linguistic ability (applicable to oral discourse) to a reading output and in this case, since we have not specified that the sentence created would have to be in writing, the output manifestation may take the same form as the manifestations of aural word recognition. What makes this a reading activity is the fact that the input is a visual perception of a word form. The same would be true of the various manifestations of word recognition through the identification of synonyms, antonyms, homonyms, appropriate modifiers, appropriate verbs, appropriate subjects, marking a distinct occurrence in different expressions, etc. Moreover, the same output manifestations may be used to indicate word recognition on auditory inputs as may be used to indicate word identification on the basis of visual perceptions. Everything we can list as a reading output manifestation can be supplied as the result of some other linguistic activity, provided a suitable auditory stimulus is available. We have already said enough about word recognition in chapter 2 to make it completely obvious that it is not a specific reading ability.

The word recognition ability is, like the abilities involved in semantical organization and linguistic search, a general linguistic ability adapted to a "reading process input" (visible inscriptions). All the outputs of word recognition can be duplicated by the outputs of auditory recognition. The ability to recognize words is not a specific reading ability, an ability which has no manifestation except in a reading output, but is rather an adapted ability, which a person who knows a language already employs in speech.

This point cannot be overemphasized in order to counteract the too vague description of children with specific reading disability as "otherwise competent and intelligent children who cannot recognize words".[12] Such children usually can recognize words since they are frequently competent or better than competent in comparison to their age group in their oral expression and in their conversational exchanges, (though there is an interesting coincidence of poor articulation and mistaken auditory discrimination with difficulties in visual word recognition). We need an explanation of why in chidren with "specific reading disability", word-recognition abilities have not adapted to the difference of input required for word recognition through perceptual discriminations among inscriptions.

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Sound identification, taken as a simple (as contrasted with a complex) process, does not have a direct correlate in the processing of oral speech but rather has an inverse correlate, when speech is taken from dictation into writing. But the rules for the two sorts of correlation are not the same. Just as some persons deliver the entire word inscription for a spoken word without sound analysis and synthesis according to a correlation of sounds to graphemes (but act as if they had completed such a correlation process successfully), so most of us can utter word sounds directly through perceiving word inscriptions, just as if we had carried out the process of correlating graphemes with phonemes -- but in fact without doing so. It is hard to convince oneself that this is a specific reading ability since it seems primarily to consist of oral responses to visual stimuli on the basis of pattern matchings between unlike things, a process which we can find in many other contexts. For example, with a set of objects (or object pictures) we can associate sounds so that the subject responds to the object-presentation or picture-presentation with the sound. That does not seem to be exclusively a reading output. Direct sounding from inscription identification is not a specific reading ability because, while there is usually no reason outside a reading context for a person to carry out direct correlations of sounds to perceived forms, the association of the process with reading is contingent; we exercise the ability to make such correlations in contexts which are not word reading contexts (music reading, for instance) and the output is not a reading output; moreover, many reading activities go on without such correlations being made. Hence the correlation of sound to inscriptions is neither a specific reading process nor a fundamental reading process.

The same may be said for letter reading. I mean here the "simple process of reading letters" where the input to the process is a visual perception which is not augmented, or substituted for the output of some concomitant reading process and the letters are identified through letter naming or through letter sounding.

Letter sounding is a particularly good example of a process which frequently is cyclical even to produce a simple output. In order to determine the sound value to be assigned to a "c" the reader must (in a word context in English) note the letters which follow (either recognize them or identify them in some way); a "p" may be silent before a "t" or altered by grouping with an "h"; Thus, for word sounding purposes letter sounds cannot be determined one by one without consideration of their grouping with other letters. Yet, in accord with what we said in Chapter 2, a person may be said to have recognized an "h" which is preceeded by a "p" if he pronounces the "p" as "f".

Needless to say, letter identification by name on the basis of inscription shape is not a specific reading ability; it is the same sort of general ability which a child has who identified tools, animals or people on the basis of his familiarity with the shape of the object, and it is the same, as the ability experienced in certain games where shapes have names and are identified by name on the basis of visual discrimination of shapes.

Letter confusion and failures to discriminate letter contrasts may be associated, as has been widely suggested, with various perceptual deficiencies; shape confusion, foreground-background confusion, etc. The same kind of identification task, discrimination on the basis of visual appearance can be generated in contexts other than reading, as is evident in many reading

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workbooks. And persons with strephosymbolia will manifest perceptual confusion there as well.

The general conclusion to be drawn from this is that there is no such thing as a specific reading ability, an ability whose exercise always and only has a reading output; rather reading abilities in about ninety percent of the reading population, are adapted abilities, abilities adapted from one sensory modality to visual inputs, and in some cases from other visual inputs to inscription inputs in particular. This suggests that there is no such thing as a specific reading disability either; that is, there is no reading disability which cannot be found, on testing, to manifest itself in a linguistic, perceptual, adaptive or motor-output defect, revealed in a task which is not a reading task.

(e) Compensation Sequencing: Physical or psycho-physical defects that defeat or greatly diminish the efficiency of the linguistic perceptual processes will have a considerable but not necessarily equal effect upon complex reading processes, like "reading for meaning". For instance, if the movement of the eyes from left to right across the page in reasonably rhythmic saccades, with both eyes in moderately accurate common focus is disturbed enough, whatever the cause may be, certain perceptual discriminations will be unreliable or entirely absent. But short of such extremes, one may encounter inefficient perceptual discrimination (on perception and letter reading tests)whose inefficiency is compensated at the "reading for meaning" stage by other reading processes. A deficient order (by some comparison to an as yet unknown "normal") of the sensory array is sometimes compensated for by the order contributed to the sensory pattern by semantic organization and prediction (projection, sense anticipation, etc.) on the basis of meaning in the message as far as it has been read up to a given time. Hence, what appears to be a reading defect or deficiency at the beginning stages may be compensated by the superior adaptation of other linguistic abilities later on and may not, therefore, justify experimental construction. (This is one of the areas in which further empirical data is needed.)

Defects even serious ones in some subsidiary perceptual processes associated with reading cannot by themselves be said to constitute reading disability; for we sometimes do not know (with the exception of such things as massive brain leisons, inability to focus the eyes, certain degrees of blindness, neurological disorders, etc.) which functions can be compensated for, which defective processes can simply be eliminated by adjustments in the way the reading process is carried out and which "minor" deficiencies in combination with other deviations from "normal" may constitute an unbreakable block for reading.

Although the number of papers and books on neuro-physiological evidence concerning reading is substantial, especially if we include the discussions of whether language disabled children are neurologically deficient and the works of general interest concerning both functional organization in the central nervous system and the brain and related disfunctions,

there is little information available which is of use for those inquiring into the way reading is logically constructed beyond some general information in passing from eye

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to brain, the experimental results concerning eye fixations, number of fixations per minute, length of fixation required to pick up maximum information, fatigue measures for fixation length, whether peripheral vision can provide sufficient information for fixation guidance, and a few other items.

In a word, we do not now have a neurophysiological model for any complete reading activity. That eventually such a model will be available is not to be doubted. But for now what we want to find out and what we already know about reading can only in spots and with great caution be expressed in descriptions which are supposed to apply to the neurological level. Naturally, massive brain damage can be detected; some brain damaged children can have the areas of damage located and can be predicted to having learning difficulties. But as Bateman (1964), Irwin and Hammil(1964-1965), Birch and Leford (1964), Dunn (1967) and others have mentioned there is not even a firm correlation between already known neurological disorders and learning difficulties. Some severely damaged children show no learning difficulties while others with no discernible neurological disorders show severe learning disorders. The same holds for the fact that some children with serious spatial and perceptual disorders have no discernible learning problems while others do; and some children with similar learning disabilities as measured on output tests have, on neurological investigation, no corresponding disorder.

In light of the over-all synthetic objectives of this report, it is worth noting that the "adaptation" part of the hypothesis accommodates some of these discrepancies; that is, in some perceptually normal children, the linguistic abilities have not adapted to the visual input of symbols whereas in perceptually disordered children the defective visual field is so well supplemented by other linguistic and cognitive skills (such as semantic anticipation, linguistic search and various such guessing and checking routines which may be individually developed) that the child exhibits no learning disorder because the visual field is richly augmented by the adaptation of linguistic abilities just as a blind man's auditory field is enriched as a source of information by a whole series of ability adaptations from other areas of experience.

C: Conclusion:

It was not possible in this paper to investigate the way adaptation to new inputs comes about for those general linguistic abilities developed for the auditory modality and later adapted to a visual modality, or to investigate the way memory functions in reading within oral discourse or to develop the hypothesis that each reading process is self-measuring (when it is simple) and that complex processes have their own biases and that the experienced reader develops an overall "reading bias" which serves to determine for each time-unit of the reading process which arrangement of input dependencies is actual and which processes are "first-level".

What has been indicated is: (1) that "reading" can be reductively analysed; (2) that reading defects are not specific; (3) that a new classification of the perceptual linguistic, adaptive, output, and sequential disorders which may inhibit or prohibit reading can be based upon the conception offered here, so that disorders may be either at the input level (neuro-physiological level of perception generally), of linguistic capabilities, of output (motor, verbal writing) skills or of adaptation of particular abilities or of sequencing of abilities and exercise or of bias or motivation; (4) that "to read" is not some mysterious, unanalysable primitive which can be understood only indirectly, bu t

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rather, like "to drive a car", "to wash one's clothes", etc., it can be analysed in terms of component non-specific abilities and their sequencing; and that (5) we can apply the results of perceptual and developmental psychology and linguistics to understanding reading as a form of linguistic perception. There has been too much concentration upon the inscriptional structure of what is read and too little attention given to the similarity of reading and listening, both of which are active linguistic perceptual activities, and to the fact that the sensory signal is, in both cases, an embodiment of inherently meaningful symbols with the consequence that the ability to read is itself an adaptation of non-specific linguistic abilities to a visual stimulus and the process of learning to read (in the focal sense of "to read") is the process of adapting the linguistic abilities (already developed for the auditory mode) to the visual mode of sensory stimulation.

These generalizations suggest that the usual classifications of reading deficiencies, defects and disabilities can be usefully rearranged so that whatever is known about such matters can be incorporated wholesale into an understanding of reading and into our diagnostic screening of students. For a student, showing obstacles to reading skill, can be very quickly checked for his proficiency in various language skills. If he is deficient in these it is evident that he will have reading difficulties, at least until his reading begins to correct the defects. A student can also be checked very quickly for motivation and for his output skills -- his ability to enunciate to formulate complete answers to questions, his motor coordination to produce them in speaking or writing, etc. He can be screened for gross perceptual disorders and even differentially tested for speaking and perceptual difficulties which may affect reading; and in some cases we know how to correct the disorder, and in others we know how to circumvent the difficulty.

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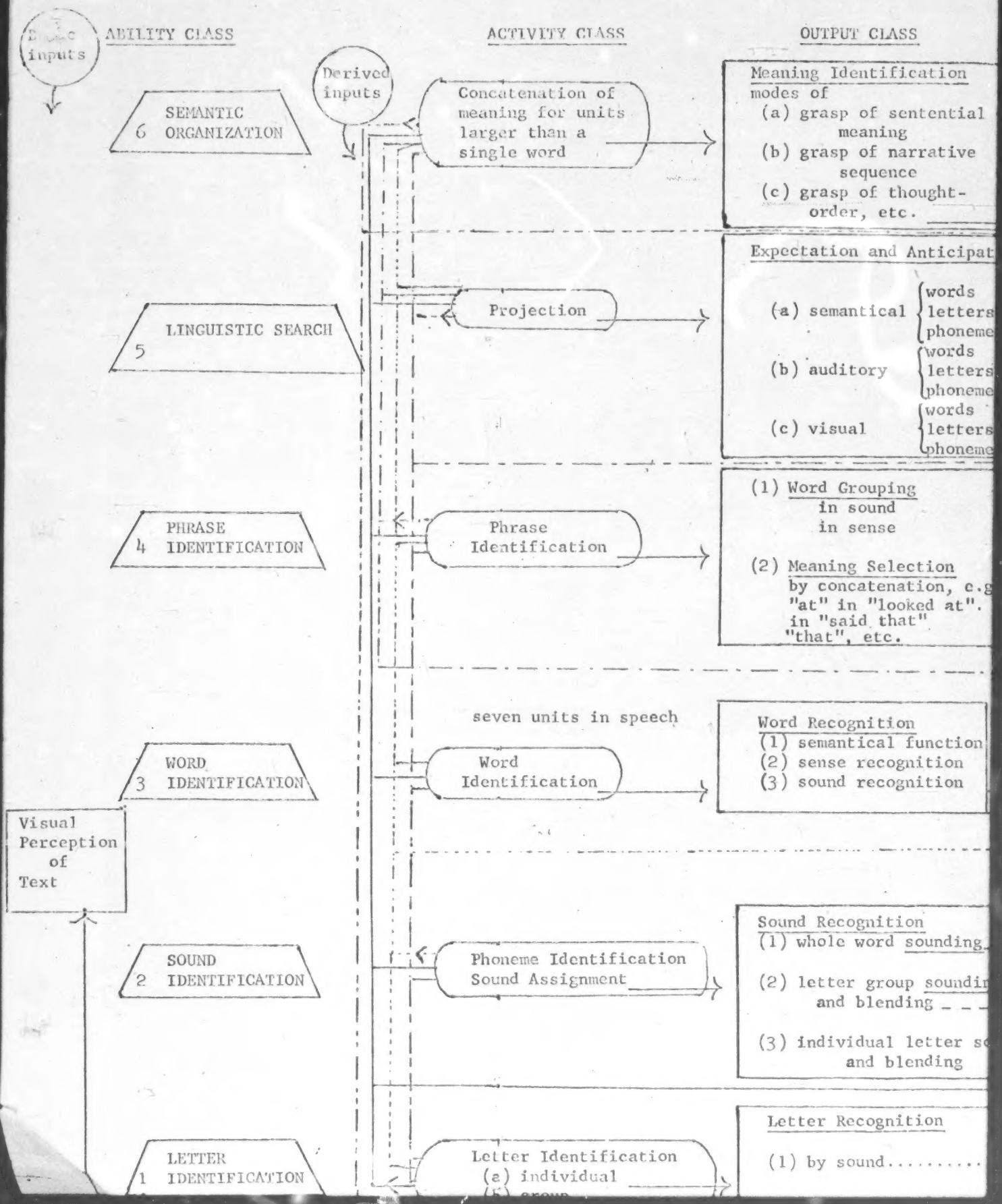

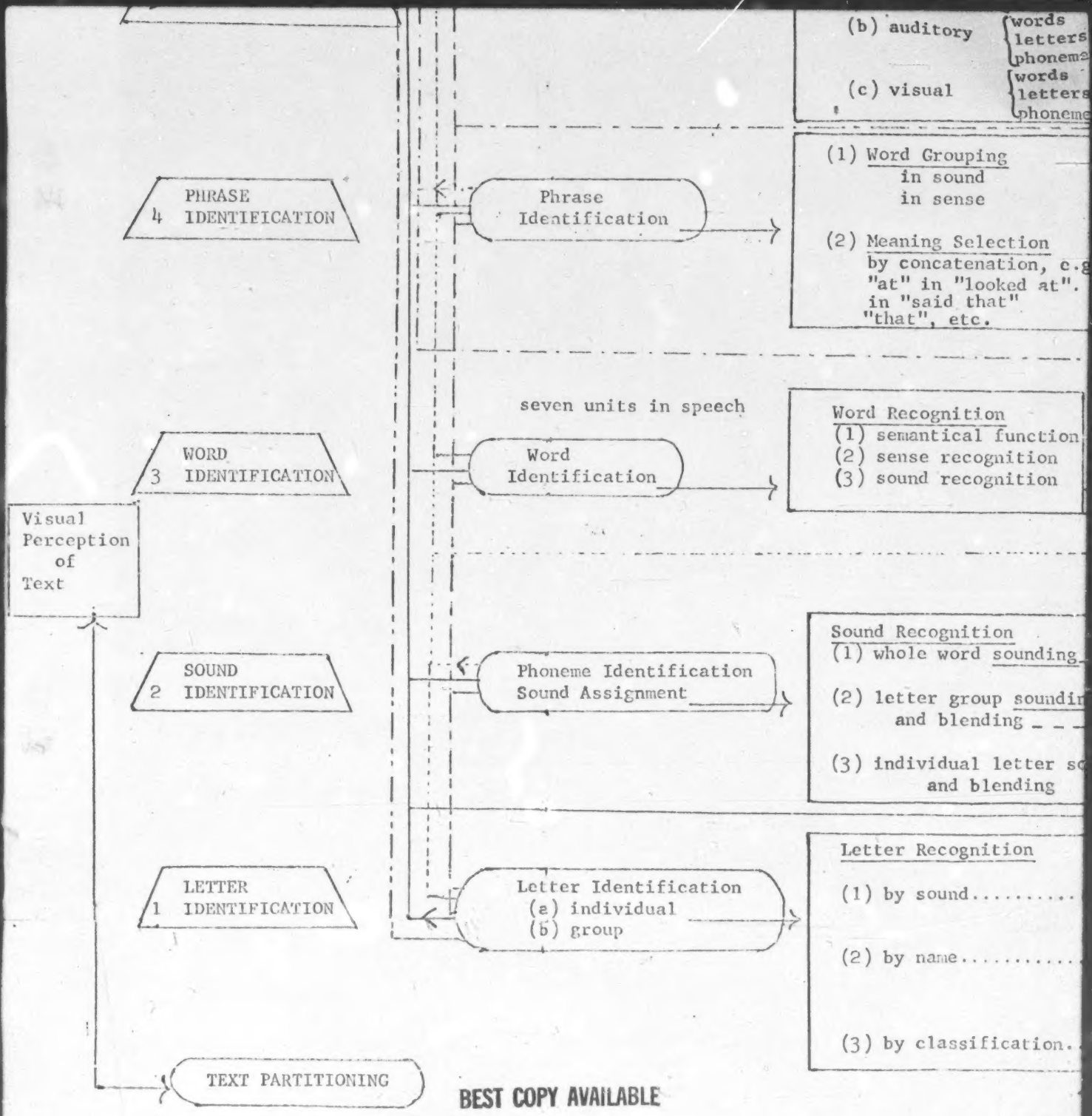

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RP YIELDING O

CLASS

OUTPUT CLASS

ILLUSTRATIVE INTERMEDIATE MANIFESTATION

n of units a

Meaning Identification
modes of
(a) grasp of sentential meaning
(b) grasp of narrative sequence
(c) grasp of thought-order, etc.

e.g. narration or summary on request
written
oral
to oneself

Reading wi
understand
or (a) of sto
or (b) of cha
or (c) of lit
or (d) of tho
or (e) of cri

n

Expectation and Anticipation

(a) semantical { words / letters / phoneme
(b) auditory { words / letters / phoneme
(c) visual { words / letters / phoneme

Event Anticipation
thought
sense
sord
semantical form
syntactical form

oral response
written response
inner response

tion

(1) Word Grouping
in sound
in sense

(2) Meaning Selection
by concatenation, e.g "at" in "looked at". in "said that" "that", etc.

(1) dist. of super-segmental phonemes in oral reading { subvocal / vocal / imaginative? / reverberatory
(2) uniting meanings
(3) specification of semantic categories e.g. for "had","at", etc.
(4) response to questions
(5) proper manipulation of sentence forms in writing.

s in speech

ion

Word Recognition
(1) semantical function
(2) sense recognition
(3) sound recognition

(1) by output test
(2) by attack forms { direct { sense / sound ; sequential { sound / root, etc
(3) by error types

ntification nment

Sound Recognition
(1) whole word sounding
(2) letter group soundin and blending
(3) individual letter sounding and blending

vocal
sub-vocal
imaginative?

e.g. to "STR"

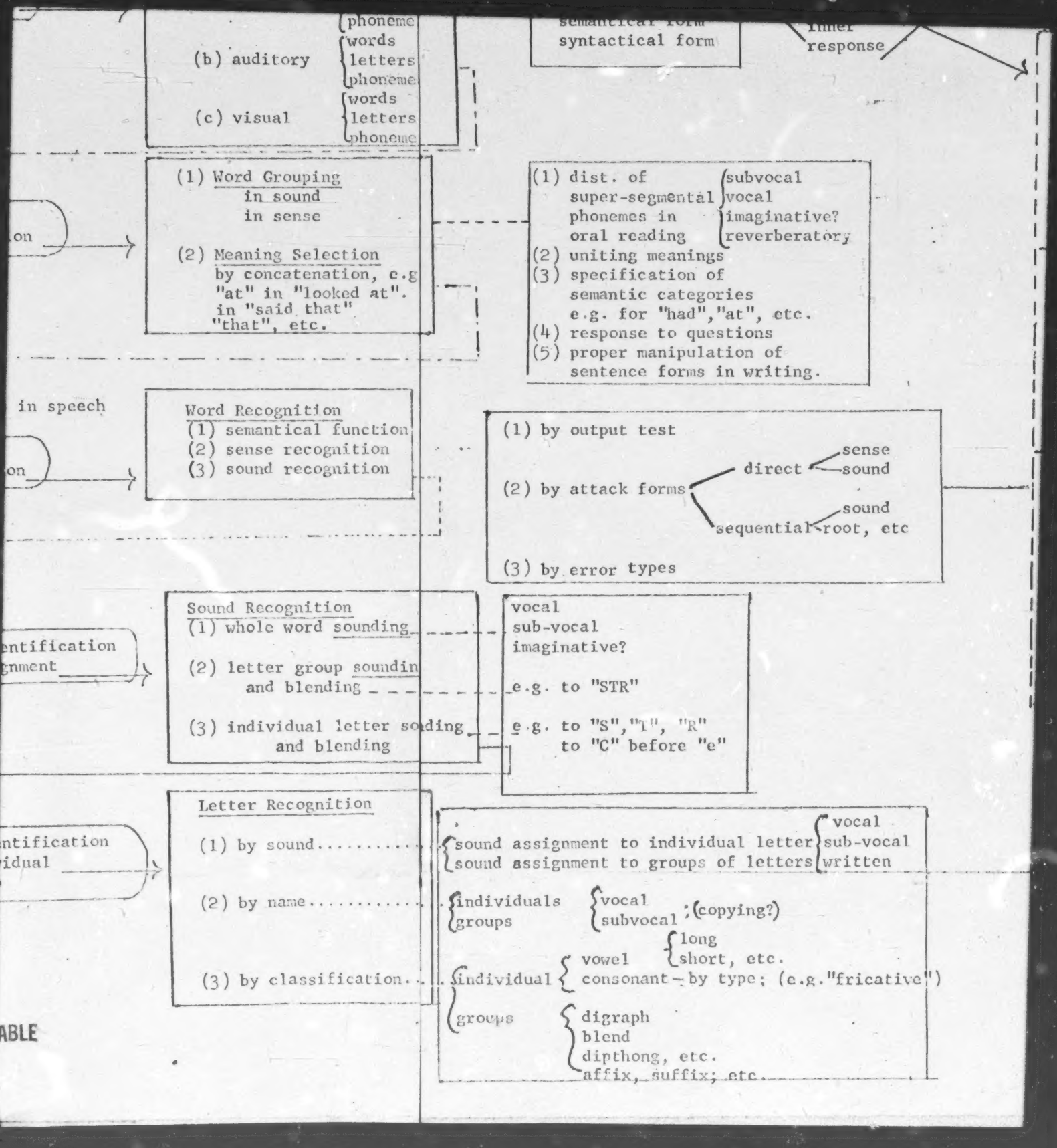
e.g. to "S","T", "R"
to "C" before "e"

ntification idual

Letter Recognition

(1) by sound.....

{ sound assignment to individual letter { vocal / sub-vocal
{ sound assignment to groups of letters { written


(b) auditory
phoneme
words
letters
phoneme
(c) visual
words
letters
phoneme
syntactical form
inner response
(1) Word Grouping
in sound
in sense
(2) Meaning Selection
by concatenation, e.g
"at" in "looked at".
in "said that"
"that", etc.
(1) dist. of super-segmental phonemes in oral reading
subvocal
vocal
imaginative?
reverberatory
(2) uniting meanings
(3) specification of semantic categories
e.g. for "had","at", etc.
(4) response to questions
(5) proper manipulation of sentence forms in writing.
in speech
Word Recognition
(1) semantical function
(2) sense recognition
(3) sound recognition
(1) by output test
(2) by attack forms
direct
sense
sound
sequential
sound
root, etc
(3) by error types
Sound Recognition
(1) whole word sounding
(2) letter group soundin and blending
(3) individual letter sounding and blending
vocal
sub-vocal
imaginative?
e.g. to "STR"
e.g. to "S","T", "R"
to "C" before "e"
Letter Recognition
(1) by sound.....
(2) by name.....
(3) by classification...
sound assignment to individual letter
sound assignment to groups of letters
vocal
sub-vocal
written
individuals
groups
vocal
subvocal
(copying?)
individual
vowel
consonant
long
short, etc.
by type; (e.g."fricative")
groups
digraph
blend
dipthong, etc.
affix, suffix; etc.

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ILLUSTRATIVE INTERMEDIATE MANIFESTATION

e.g. narration or summary on request
written
oral
to oneself

0-MANIFESTATIONS (Illustrative)

= 0

Reading with understanding
or (a) of story line
or (b) of character
or (c) of literary genre
or (d) of thought
or (e) of criticism, etc.

Event Anticipation
thought
sense
.sord
semantical form
syntactical form

oral response
written response
inner response

ORAL RESPONSE
(a) narration and summary
(b) criticism and comment
(c) answers to oral questions

(1) dist. of super-segmental phonemes in oral reading { subvocal, vocal, imaginative?, reverberatory }
(2) uniting meanings
(3) specification of semantic categories e.g. for "had","at", etc.
(4) response to questions
(5) proper manipulation of sentence forms in writing.

WRITTEN RESPONSE
(a) written synopsis
(b) written criticism or story complerion or alternation
(c) answers to written questions

(1) by output test
(2) by attack forms { direct { sense, sound }; sequential { sound, root, etc } }
(3) by error types

INNER RESPONSE
(a) satisfaction vs. dissatisfaction
(b) reinforced desire and suspense, or relaxation of; questions, etc.
(c) "interior" speech

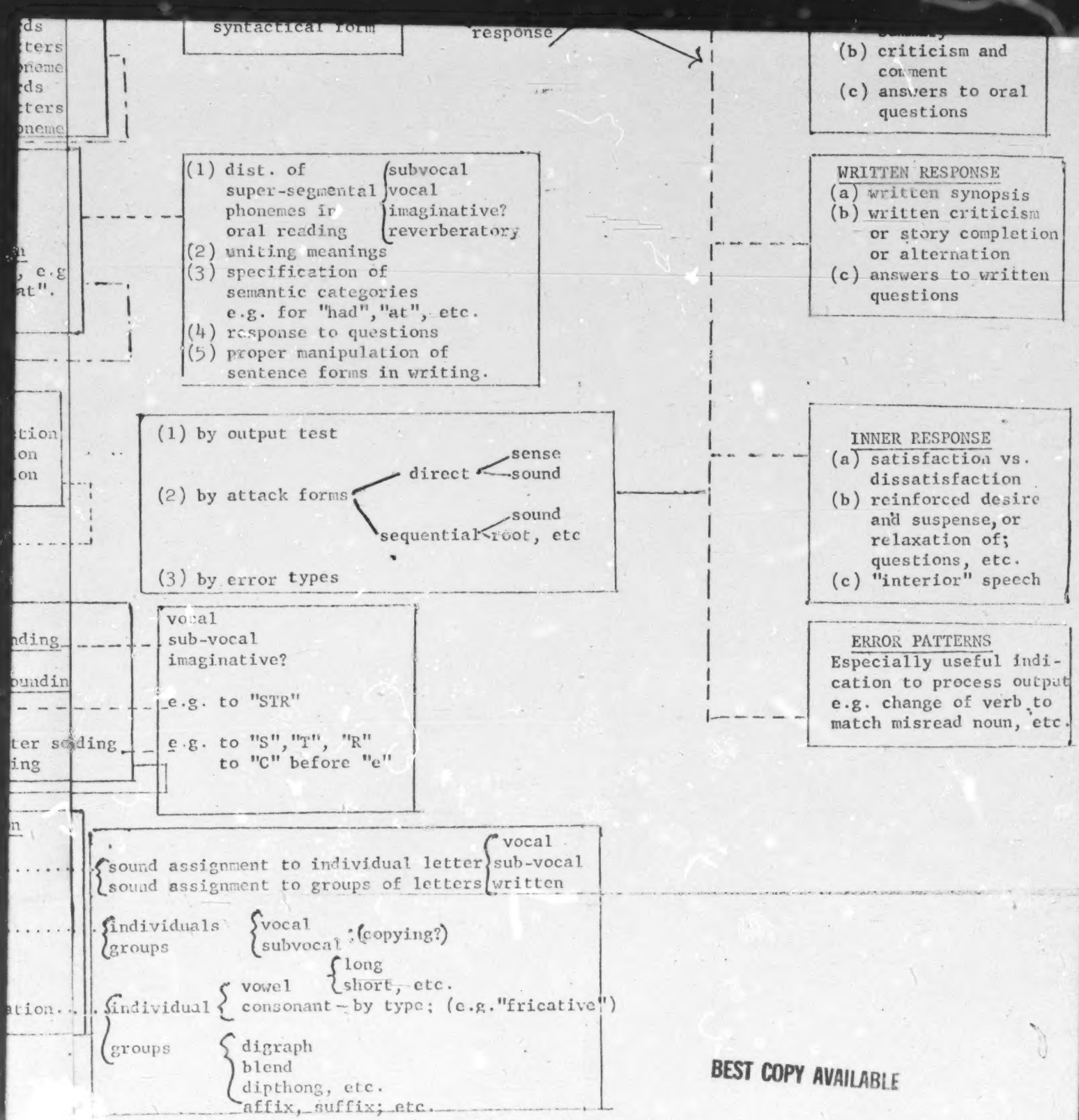
vocal
sub-vocal
imaginative?

e.g. to "STR"

e.g. to "S","T", "R"
to "C" before "e"

ERROR PATTERNS
Especially useful indication to process output e.g. change of verb to match misread noun, etc.

{ sound assignment to individual letter, sound assignment to groups of letters } { vocal, sub-vocal, written }



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Notes

Footnotes for Chapter 1.

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1. 1. Kolers, Paul A., ed., The Psychology and Pedagogy of Reading, by E. B. Huey, Introduction by Kolers, xiv (M.I.T. Press, 1968.)

1. 2. Chall, Jeanne, Learning to Read, The Great Debate, p. 88, remarks: "Taken as a whole, the research on beginning reading is shockingly inconclusive." (McGraw Hill, 1967).

1. 3. The notion of a "paradigm" is introduced by T. S. Kuhn, The Structure of Scientific Revolutions (International Encyclopedia of of Unified Science, University of Chicago Press, 1970): "Acquisition of a paradigm and of the more esoteric type of research it permits is a sign of maturity in the development of any given scientific field." p. 11.

1. 4. Smith, Frank, Understanding Reading, (Holt, Rinehart and Winston, Inc. 1971).

1. 5. This seems especially clear in the informal exchanges with various participants in the Proceedings of the Conference on Communicating by Language (The Reading Process, February 11-13, 1968, New Orleans, La., under the auspices of and published by the U.S. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health, National Institute of Child Health and Human Development, Bethesda, Maryland.)

1. 6. This view is found in several publications, particularly, Hochberg, Julian, "Components of Literacy", Chapter 6 of Basic Studies on Reading, edited by Harry Levin and Joanna P. Williams (Basic Books, New York, 1970).

4. 7. Kuhn, op. cit.; See his account of scientific revolution through the development of paradigm changes.

5. 8. Hochberg, op. cit., loc.cit., note 6. Smith, op. cit., suggests similar ideas, pp. 102-104.

5. 9. Hochberg also has a theory of Cognitive Search Guidance, which allows for guidance through Higher Cognitive Units. Cf. op. cit., note 6, above, pp. 75 and 76.

5. 10. On eye-voice spand, cf. Smith, op. cit., 196 and the papers he cites at 210-211. There is, of course much more information available on these points, but this is illustrative.

5. 11. Cf. Kolers on Bilingual indifference: "Three Stages of Reading", chapter 7 in Levin and Williams, op. cit., note 6 above, particularly the section entitled "Direct Perception of Meaning and Relations", pp. 109-118. Also, Kolers, Paul A., "Reading and Talking Bilingually", American Journal of Psychology, 19 6, 79, 357-376.

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7. 12. Russell, Bertrand; Human Knowledge: Its Scope and Limits, 1948 (Simon and Schuster, New York, 1964).

7. 13. Ableson, Raziel,"Definition", article in Encyclopedia of Philosophy (Vol. 2, the MacMillan Company, New York, 1967), with a section on Contextual definition and a clear comparison to other forms of definition. See also the Articles on Russell and Wittgenstein.

8. 14. Wittgenstein, Ludwig, The Brown Book, pp. 119-125 (Harper Torchbook, Harper and Row, N.Y., 1965 and Investigations, pp. 61-71. Translated by G.E.M. Anscombe, The Macmillan Company, N.Y. 1957). In both places there is an extensive discussion of reading which indicates that there is a family of concepts and not a single mental activity or kind of experience which constitutes reading.

8. 15. See note 5 above and: Chall, Jeanne in Learning to Read: the Great Debate, (McGraw Hill, New York, 1967) p. 83: "My analysis of the existing experimental comparisons of a meaning emphasis versus a code emphasis tends to support Bloomfield's definition that the first step in learning to read in one's native language is essentially learning a printed code for speech we possess". With due allowances for the judicious vagueness with which Dr. Chall employs the ideas of "code emphasis" and "decoding", a judiciousness which keeps what is objectionable about this view in theory from becoming harmful in her critique of instructional experiments and literature, it is still not even plausible that printed language should be regarded as a "code" for oral speech. There is no meaning in a string of dots and dashes in virtue of their own structure; there is in a string of words. The same sort of criticism applies to the view of Venezky, "Reading is translating from written symbols to a form of language to which a person can already attach meaning"; "the core task in reading is going from printed symbols to that form of language to which he already attaches meaning" (Communicating by Language, The Reading Process, p. 17, ed. James F. Kavanaugh, NIH Conference, 1968).

8. 16. Wittgenstein makes this claim in The Brown Book, p. 120 and in the Investigations p. 62, n. 156.

8. 17. Gephart, William, progress report on "The Convergence Technique and Reading: a Progress Report", presented to the Annual meeting of the International Reading Association, May 2, 1969, Kansas City, Mo.

Footnotes for Chapter 2

11. 1. Ross, James F., "A New Theory of Analogy", Proceedings of the American Catholic Philosophical Association, 1970, pp. 70-85, and "Analogy and the Solution of Some Cognitivity Problems", The Journal of Philosophy, October 22, 1970, 725-746.

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11. 2. Cf. Wittgenstein examples in the Investigations, p. 24, n. 160 and n. 161.

11. 3. See Chap. op. cit., for a detailed analysis of the available date and the conclusion that the evidence does not establish the superiority of one teaching method over another for normal children.

11. 4. Hochberg, J.; "Perception: Toward the Recovery of Definition", (Psychological Review, Vol. 63, n. 6, 1956, p. 400-405.

29. 5. Lyons, John; Introduction to Theoretical Linguistics, Cambridge University Press, 1969; cf. the discussion of syntagmatic and paradigmatic relations, pp. 70 ff. and 428 f.

31. 6. Lewis, C. I., An Analysis of Knowledge and Valuation, Chapters III and IXX on the Modes of Meaning and Meaning and Language, and Chapter V on Linguistic Meaning and Sense Meaning. This is a very important source of information.

31. 7. Cf., Smith, op. cit., Chapters 7 and 8.

31. 8. Smith, see note 7 above and Hochberg, see note 6 of Chapter 1.

31. 9. Cf., Smith's account of immediate word recognition, op. cit., p. 128.

31. 10. Apparently Piaget's theory of cognitive development supposes that there is a complete cognitive reorganization in the translation from one developmental stage to the next.

37. 11. Wittgenstein in the Blue Book (published with the Brown Book, cited above), asks "What is the meaning of a word" in order to show that meanings do not attach to words.

37. 12. We employ here the common assumption of developmental psychologists that sounds have meaning for small children just in so far as they use them to interact with people.

41. 13. Smith, op, cit., p. 37. There is a good list of the difficulties in the assumption that there is a sound-spelling correlation which beginning readers must learn.

41. 14. Smith, op. cit., has a number of clear observations on the correlation of written and spoken language.

41. 15. See Smith, op, cit., Chapter 12, "The Identification of Meaning".

41. 16. Within the Piagetian theory, there is supposed to be experimental evidence which shows that verbalization effects discrimination of embedded figures.

41. 17. Smith, op. cit., redundancy and its use, 201, 219, 224.

Footnotes for Chapter 3.

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58. 1. Smith; op. cit., p. 74.

59. 2. Of course, there is a sense in which "S reads the text of the memorandum" entails that "S reads the words of the memorandum" and, therefore "S reads the letters of the memorandum", see Chapter 2 on "word recognition". But clearly those senses of "S reads the words of T" and "S reads the letters of T" are derivative from this sense of "S reads reads T" and are quite different from the senses of the expressions which we have been using since that entailment is the one thing which we have specifically excluded.

60. 3. Thus: A RP leading to O is complex iff RP leads to O involves a pair or more of reading activities which are input-ordered. And a pair of reading activities is input ordered iff the output of one is in whole or in part the input of the other in some time slice of RP in which both are components.

60. 4. Let me remind you that I am calling anything a reading process which has an outcome which we would, at least sometimes, call a reading outcome (e.g. "A grasp of the meaning of the text on the basis of perceiving the inscriptions"; "recognition of a word in a text"; "recognition of letters in a text", etc.) a reading process leads to a reading outcome (though it may not achieve it in a particular case, just as exercise leads to good health regardless of the number of cases in which it fails or is prevented).

60. 5. As what follows will make evident, this identity condition is never satisfied.

60. 6. Of course if both R and R' in RP are "first level" all the time, then it follows that there is another reading process component of RP, call it R^2 such that R^2 is "input dependent" upon either R or R' or both. And it is possible, if we postulate that RP occurs over a suitable interval of time, that if R and R' are the only reading-process components of RP, that the order (which consists in input-dependence) between R and R' may vary, so that in one sub-interval R derives its input from the output of R' and in another that R' derives its input from R. But not just any two reading processes can be thus variably related, only those of level 3 and below, because only those can be "first level".

61. 7. This allows us to define a "compound-complex" reading process as one which involves parallel reading processes, whose outputs are ordered as input to one or more component reading processes in the complex. And this is the structure common to what are usually called the "higher-level" reading processes.

61. 8. We can note that R is a simple reading process in RP leading to O only if R's input is neither in whole nor in part the output of some other reading process during the interval in which R is "first level". The first level reading processes will be "simple" reading processes with respect to O; whereas, the reading processes whose inputs are in whole or in part the outputs of other reading processes

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will by contrast be called the derived reading processes within the RP leading to O. Because we can consider a complex reading process (which occurs over a significant time interval) both linearly and vertically, the same reading process may be simple and derived within different "vertical slices" of RP and linearly speaking, a component process is simple if there is any vertical slice in which it is simple.

63. 9. Hans G. Furth, in The NIH Colloquium referred to in Chap. 1 said (in talking about deaf children); "The vast majority of the children and now children who do not know language. And the main problem is no longer speech or lip-reading. The main problem is linguistic competence. And this is what I think educators have yet to realize." p. 197.

64. 10. Since such a large portion of the so-called "higher level" reading processes consist of the exercise of abilities adapted to a reading input or to a visual output, an investigation of the way already operative abilities can be adapted to modally distinct inputs or outputs may reveal a good deal which is of practical pedagogical interest.

66. 11. I cannot here present the arguments which demonstrate that neither the inscription of "w" nor the sound of "w" is identical with "w". But there is just as much reason for saying that the meaning of written language is intrinsic to it as there is for saying this about uttered language; see Chap. 2.

66. 12. Chall says: "Indeed, the true reading-disability pupil can be described as follows: He is intelligent enough to understand the stories that other children of his age and mental ability can read (when these are read to him), but he cannot read them himself -- because he cannot identify the words." (P. 176). Of course, Chall understands the distinction I am drawing; my objection is the chiefly technical one that her comments do not distinguish the various kinds of word identification which actually are involved.